NATUR CYMRU

The Nature of Wales

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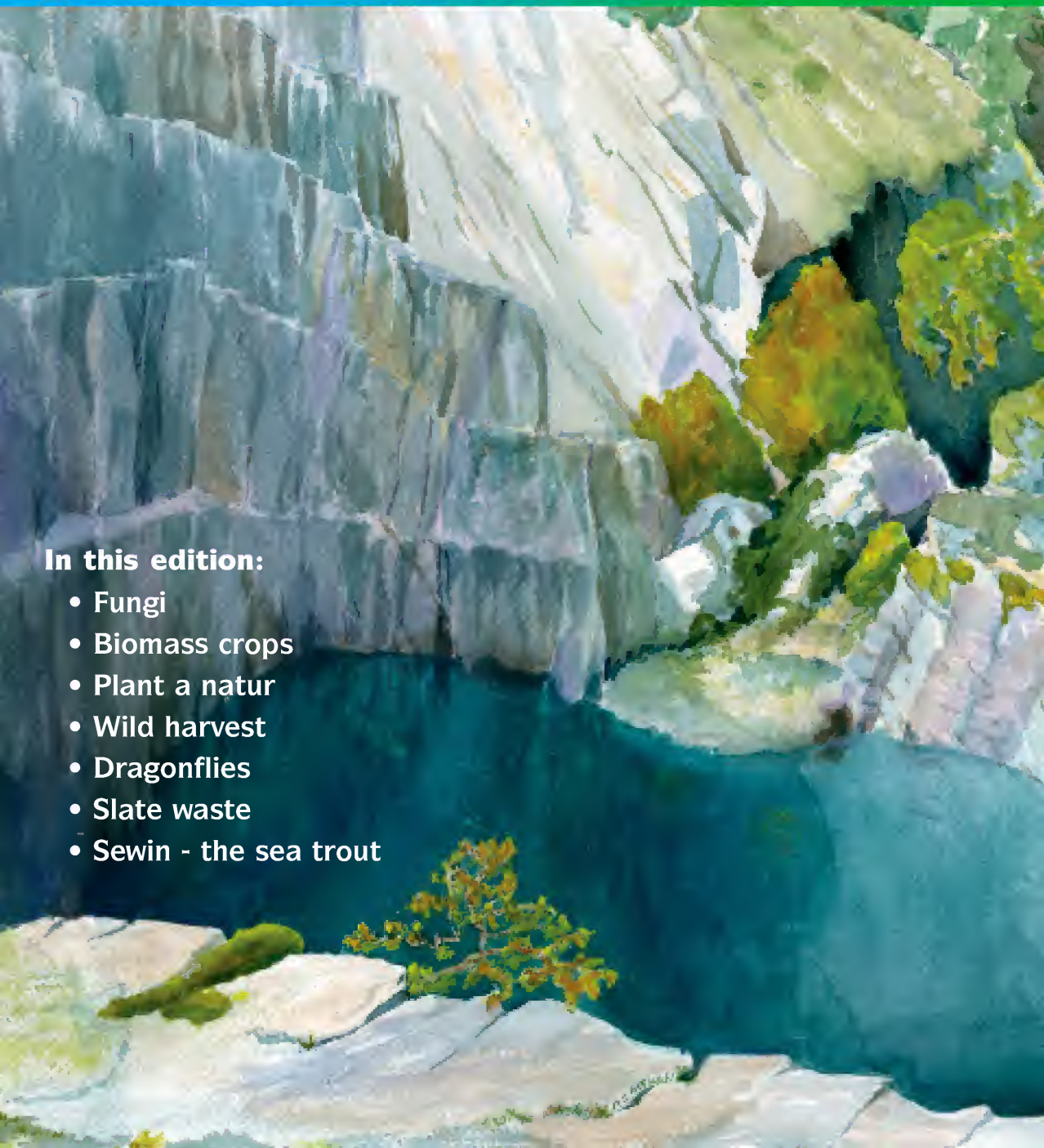

In this edition:

- Fungi
- Biomass crops
- Plant a natur
- Wild harvest
- Dragonflies
- Slate waste
- Sewin - the sea trout

NATUR CYMRU
The Nature of Wales

Golygydd/ Editor:
James Robertson
naturcymru@gmail.com

Golygydd Cynorthwyol/
Assistant Editor:
Mandy Marsh
Tel: 01248 385574
m.marsh@ccw.gov.uk

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Natur Cymru is intended to promote the exchange of information about biodiversity and encourage debate. If you have information, ideas for articles or artwork which you think might be of interest to readers, please contact the Editor.

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P.S. Aitken

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NATUR CYMRU GOLYGYDDOL

Pleser o'r mwyaf fu chwilio am straeon yn sôn am dreftadaeth ein bywyd gwyllt - sef rhywbeth sy'n dal i fod yn hynod gyfoethog, er gwaetha'r pwysau masnachol diddiwedd a didostur. Profiad braf hefyd fu nodi ar ddu a gwyn ymdrechion yr unigolion a'r sefydliadau hynny sy'n amddiffyn yr amgylchedd - rhywbeth sydd mor bwysig i fywydau a mwynhad pob un ohonom. Mae'r erthyglau a geir yn datgelu cyfrinachau'r siwin, yn sôn am ledaeniad gwesynnod fel yr ymerawdwr (*Anax imperator*) a'r orthetrum llinell-ddu (*Orthetrum cancellatum*), yn cyfeirio at wledd o ffyngoedd, ac yn nodi sut y cafodd gwastraff llechi ei droi'n gynefin i fywyd gwyllt. Mae dwy o erthyglau'n deyrnged i'r rheini sy'n dod â'r amgylchedd yn fyw i'n plant.

Un o ddibenion y cylchgrawn yma yw sôn am yr agenda amgylcheddol sydd ohoni, gan hyrwyddo'r drafodaeth ynghylch pynciau sy'n effeithio ar fywyd gwyllt. O dro i dro, mae rhai erthyglau'n arwain at wrthatebion, megis y cyfnewid barn a gafwyd dro'n ôl ynghylch cyflwyno'r barcud. Mae cael trafodaethau o'r fath yn beth iach iawn, a hoffwn annog mwy ohonynt. Enghreifftiau o bynciau dadleuol yw tyrbinau gwynt a ffynonellau ynni cynaliadwy. Yma, mae Catherine Heywood yn ystyried agwedd arall ar ynni - sef y buddion a ddaw yn sgil cnydau biomas, megis hesg eliffant a math arbennig o helyg. Mae'r farn ynghylch y buddion a all ddeillio o gnydau biomas yn amrywio'n fawr, gan ddibynnu ar raddfa, lleoliad a dull yr amaethu. Gynt, roedd nifer o ffermydd yn neilltuo traean o'u tir i dyfu pethau a oedd, yn y bôn, yn gnydau ynni - porthiant i fwydo ceffylau. Yn ystod y rhyfel diwethaf, roedd rhai ohonynt yn tyfu aceri o lin (flax) ar gyfer y diwydiant dillad. Dydy'r arfer o ddefnyddio'r tir i dyfu biodanwydd neu ddeunyddiau i wneud dillad ddim yn newydd o gwbl. Efallai mai'r rhain yw cnydau'r dyfodol.

Yr adeg honno, fodd bynnag, câi pelydrau'r haul eu dal gan blanhigion porthi i greu tanwydd ar gyfer cynnal tractorau pedair coes. Heddiw, fe fydd cryn dipyn o'r ynni a ddefnyddir i dyfu cnydau, yn ogystal â'u cynaeafu a'u prosesu, yn gorfod cael ei ychwanegu at y broses trwy fenthyg o gafn carbon naturiol ac enfawr y Blaned, sef y cronfeydd tanwydd ffosil. Mae dwy ran o dair o nitrogen a phedair rhan o bump o ffosfforws yn cael eu defnyddio ar ffurf gwrtaith artiffisial sy'n cael ei daenu ar y tir. Mae hyn yn cyfrannu at ollwng mwy o nwyon tŷ gwydr i'r atmosffer, a dyma sy'n creu llygredd ac yn niweidio'r amgylchedd.

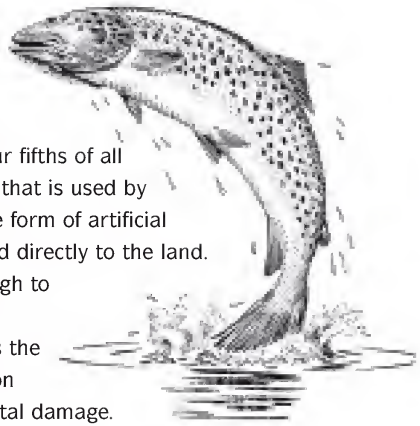
Mae pob un ohonom yn elwa'n eithriadol ar yr amgylchedd; ond, yn anffodus, dydy'r gweithgareddau economaidd y mae economegwyr yn eu cyfrif a gwleidyddion yn eu hannog ddim yn rhai sy'n esgor ar fuddion naturiol, yn aml. Efallai mai'r ffordd ymlaen yw mynd i'r afael â gweithgareddau cwbl gynaliadwy ar raddfa lai, fel y rhai y mae Yun Hider yn sôn amdanynt.

Sewin

Os bydd unrhyw beth yn y rhifyn hwn yn tanio eich diddordeb, pam na wnewch chi ymateb? Rwyf bob amser yn chwilio am erthyglau heriol a llawn gwybodaeth, ond rwyf hefyd yn fodlon cynnwys tudalen lythyrau - os derbyniwn ni ddigon!

James Robertson

NATUR CYMRU EDITORIAL



It has been a joy searching out stories about our heritage of wildlife, which remains incredibly rich in spite of relentless commercial pressures; and to put on record the valiant efforts of individuals and organisations in defence of our life-enhancing and life-sustaining environment. Articles follow which reveal the mysteries of the sewin (sea trout), the spread of dragonflies like the blue emperor and the black-tailed skimmer, a festival of fungi and the transformation of slate waste to wildlife habitat. Two articles are a tribute to those who are bringing the environment alive in the minds of the young.

Part of this magazine's purpose is to report on the contemporary environmental agenda, and promote debate about issues affecting wildlife. Sometimes articles prompt ripostes, such as the exchange we had in these pages a while ago about red kite introductions. This is all to the good, and I would welcome more debate. Wind turbines and sustainable energy sources have garnered their share of controversy. Here Catherine Heywood looks at another aspect of the energy issue - the benefits of biomass crops such as elephant grass and short rotation coppice willow.

There are many shades of opinion on the benefits of biomass crops, depending on scale, location and methods of cultivation. Many farms once commonly devoted a third of their land to what were effectively energy crops - fodder to feed horses. During the last war some of them grew large acreages of flax for the clothing industry. There is nothing new about using the land to grow biofuels or natural clothing materials. These may be the crops of the future.

On the other hand, in those days it was the energy of the sun, captured by fodder plants, which fuelled four-legged tractors; today some of the energy used to grow energy crops, harvest them and process them, will have been added to the process by borrowing from the planet's huge natural carbon sink, the fossil fuel reserves. Two thirds of all the nitrogen and four fifths of all the phosphorus that is used by humans is in the form of artificial fertilizers applied directly to the land. This feeds through to greenhouse gas emissions and is the cause of pollution and environmental damage.

The environment confers benefits on us all which are literally too huge to measure, and unfortunately the kinds of economic activity which economists can count and politicians encourage are seldom those which draw on these natural benefits. Perhaps more small-scale, truly sustainable activities like the one described by Yun Hider may be the way forward.

If anything in this edition provokes you, then why not write a response? I am always on the look-out for informative and challenging articles, but equally would be happy to introduce a letters page, if the letters are forthcoming!

James Robertson

Blue emperor mature female

Allan Brandon

Bringing fungi into focus: **the Moelyci Festival**

Hygrocybe ingrata - rare and probably the best 'indicator' waxcap of them all. Young specimens

Over two weeks in October the Moelyci Environmental Centre in north Wales became the focus for a festival of fungi. This married popular events and 'awareness- raising' with a serious attempt to raise the conservation profile of a neglected branch of biodiversity, as JOHN HAROLD explains.

The germ of an idea for the fungi festival stemmed from the popularity of past forays at Moelyci. These have been so successful over the last five years that we felt it was time to take things a bit further and cover different aspects of the fungal world. The idea was to bring fungi into focus as a vital part of our biodiversity, as a subject for much-needed study and conservation attention, and as a source of visual and culinary delight. To achieve this we planned a series of events including a conference on the conservation of fungi, a workshop to increase grassland fungi identification skills, a feast of fungi to conclude the celebrations, and, of course, the now traditional fungus foray to kick the festival off.

We started talking to the Millenium Stadium Charitable Trust about funding, and their response was so favourable that the plans suddenly became entirely achievable. Mycological expertise for the conference

All photos: John Harold

and the training workshop was readily forthcoming. Culinary skills were offered by ex-chef and Moelyci member Bill Pywell, and commercial growers Smithy Mushrooms made a very generous offer to provide a range of mushroom varieties for the feast. Roy Tapping of Cofnod also went out of his way to help us with a venue and logistics for the fungi conservation conference.

When multi-faceted support like this is available the whole process of organising becomes much more enjoyable, and a little less daunting and time-consuming. The vital ingredients were all there - an idea, resources, and people with the skills and generosity of spirit.

The Fungus Foray

Why are forays so popular? They seem to attract people who would otherwise have little day to day contact with, or active interest in, the natural world. Perhaps they appeal to a primitive hunter-gatherer instinct. However, it is also true that the people of these islands have a relatively poorly developed knowledge of the wild mushrooms around them. For most people the assumption is that they are poisonous unless you definitely know otherwise. Across much of Europe the opposite presumption holds sway: that fungi are edible unless you recognise them as one of the poisonous species! It will be interesting to see whether the arrival of numbers of fungi-savvy Eastern Europeans here starts to affect the cultural perception of fungi.

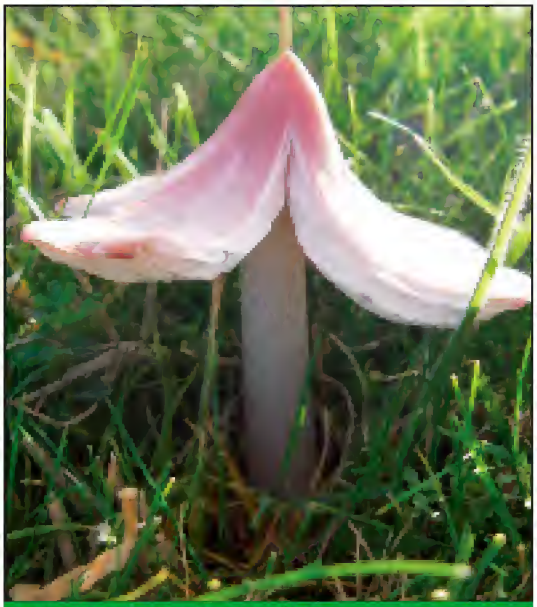
Charles Aron and Debbie Evans imparting some of their wisdom

In the meantime, perhaps the fungus foray provides a comfortable compromise, allowing us to satisfy our hunting instinct, without the emphasis on actually eating what we 'catch', and with the added security blanket of an expert on hand to sort out the goodies from the baddies.

Over a hundred people of all ages, from newborn to the very elderly, came together on a blustery Sunday afternoon on 1st October. Nigel Brown did an outstanding job of explaining some of the key points which mark fungi out from the animal and plant kingdoms. We also had the help of Charles Aron and Debbie Evans for identification purposes, and Dr Mike Hale of the University of Wales Bangor provided some detail on timber-rotting species.

Nigel Brown standing on one of our green waste compost heaps - very productive for fungi

A total of 124 species were recorded, with highlights such as the deadly poisonous panthercap *Amanita pantherina*, a scarce bolete *Boletus versicolor*, the bracket *Lenzites betulina* (which



Pink waxcap *Hygrocybe calyptriformis*

has been given the less than inspiring recommended English name birch mazegill), and the glutinous waxcap *Hygrocybe glutinipes*, pink waxcap *H. calyptriformis*, and crimson waxcap *H. punicea*. The significance of the waxcap finds will become clear shortly.

Conservation of Fungi in Wales Conference

The conference took place on 7th October and was attended by 40 delegates from all over Wales, and one from Ireland! The underlying idea was to bring together mycologists, ecologists and conservationists to consider the importance of our fungal assemblages and to highlight the challenges which face us in conservation terms.

Never having organised a conference before, the preparation was a little nerve-racking, though made easier by the helpful attitude of the key people involved.

We heard from Gareth Griffith (UW Aberystwyth) on the global importance of Welsh waxcap grasslands. His recent research on high-quality sites across Wales has helped us to refine our understanding of these enigmatic communities. Perhaps most fascinating are the further questions opening up from his research. Carbon and nitrogen partitioning in grassland fungi is very different from that in other organisms; we still do not really understand the saprotrophic roles played by the waxcaps and their allies.

In the context of a largely neglected kingdom, the colourful waxcaps have been dubbed 'charismatic megafungi'. Towards the other extreme, Debbie Evans gave an illuminating talk on a true 'cinderella' group, the rust fungi. Extraordinary lifestyles, host interactions and delicate miniature structures were all bound together in this beautifully illustrated contribution.

Charles Aron drew our attention to some specialised mycorrhizal fungi communities in the northwest of Wales. Most remarkable of all was the mind-bending concept of mountain summit communities, where mycorrhizal fungi survive in the thin layer of humus which passes for soil. Here species such as the alpine *Russula aureana* and mountain grisette *Amanita nivalis* tower over the carpet of dwarf willow *Salix herbacea* 'trees' with which they are inextricably associated.

Professor Bruce Ing, the world authority on slime moulds, took us through the key biological factors affecting the conservation status of fungi, and gave an account of the meaning of 'rarity' which condensed a lifetime's experience. There were stark reminders of the impacts of nitrogen deposition (acid rain) on mycorrhizal fungi, and the implications for 'stupid' forest trees, which have forgotten how to survive independently of their fungal symbionts. Bruce underlined the importance of long-term geographically defined studies in mycology, and acknowledged how hard it is to find funding for such work.

Commercial collecting of fungi was covered by Mike Hale, who has trawled the available UK data. In Wales such collecting currently falls far short of the major enterprises in Scotland, where it is estimated that for just one of the target species (chanterelle), exports amount to 15,000kg per annum. Commercial collecting is likely to increase in Wales, and we have a wide range of commercially exploitable species. He echoed some points from

Hygrocybe spadicea specimens found by John Harold at Rhiwlas as a direct result of seeing Andrew Graham's specimens at the conference

Bruce Ing's talk on the impacts of collecting, reporting long-term studies in Switzerland which found correlations between the trampling of sites and reduced fruit-body production. The studies support the view that the picking of fungal fruit bodies is probably not a harmful activity in itself, whereas repeated trampling of favoured picking sites almost certainly damages the fungal mycelia.

Geoglossom atropurpureum

Ray Woods (Plantlife) drew together many of the strands of the day, and focussed on the data gaps and current foci of conservation efforts, particularly through the statutory designation processes. He highlighted major obstacles to these processes (ignorance being a prime factor) and gave a clarion call for greater attention to be paid to fungi, as ecosystem drivers at every level. He commented that the level of interest indicated by the conference audience gave some cause for hope in this respect.

Andrew Graham brought along a specimen of the rare date waxcap *Hygrocybe spadicea*, a BAP species which he had just added to his own site list. Now, Andrew and I have a friendly rivalry over our moth recording, so it was with some delight that I went out the next day and found *H. spadicea* about 150m from my front door! There is nothing more useful than seeing something in the flesh to assist recognition, and therefore enable recording.

Grassland Fungi Identification Course

This course teaches the basics of identification for waxcap fungi and their allies. Having run the same course in the same place the previous year, we were completely unprepared for the dramatic turn of events on 10th October.

The day began with an indoor session where we were made familiar with the critical features of waxcaps, including their respective colours, smells, and textures. A superb array of specimens was assembled by the course leaders, Debbie Evans and Charles Aron. In the afternoon, we went out to test our newly acquired knowledge on a field of the

neighbouring farm, Ty'n y Caeau. We had used this field the year before and found it to support a good range of the commoner species, hence useful for identification training. No surprises here; roughly the same range of species was again present this year.

Clavaria zollingeri

With half an hour left, talk turned to the recent fungus foray, at which Debbie remembered having seen a pink waxcap *Hygrocybe calyptriformis* on the table. By a stroke of luck the person who had found that specimen (sharp-eyed Moelyci member Anita Daimond) was a participant on this training day. She remembered having found it on a Moelyci field, so we quickly made our way to the field in question to see whether the pink waxcap (a BAP 'flagship' species) really was any good as an indicator for high-quality waxcap pastures.

What we found was quite a shock, a really impressive assemblage including *Hygrocybe ingrata* (smelling of bleach) and the stunningly beautiful violet coral *Clavaria zollingeri*. The other participants thought they were going have to carry me back to the farmhouse, as this was perhaps the most exciting moment of my life as a naturalist. Why? Well, what they could only imagine was the personal drama of discovering a nationally or internationally important site for grassland fungi on Moelyci land. Having worked hard to get grazing (Welsh Black cattle) onto this part of the land, when others might have happily planted trees on it, this was the ultimate experience of 'reward-for-effort'.

This discovery also provided a valuable perspective for the participants on the course. One of them (experienced naturalist Ian Fraser) told me afterwards that in six years in the southeast of England he had seen 15 species of Hygrocybe. We had seen 22 species in one afternoon, in two modest-sized fields a few hundred yards apart. This was a real-life example of what Gareth Griffith had told us just three days previously: the international importance of Welsh waxcap grasslands. Since then we have added several more 'choice' species to the list, including the uncommon nitrous waxcap *Hygrocybe nitrata*, orange waxcap *H. splendissima*, and the charismatic blushing waxcap *Hygrocybe ovina*, which is actually a dead ringer for a sheep turd!

Feast of Fungi

If organising the conference was a new experience, then the Feast of Fungi was truly uncharted territory. It turned out to be a visual and culinary delight and, intriguingly, a genuinely multicultural occasion, with people of at least eight different nationalities present. This was interesting as it is quite an unusual occurrence in rural villages in north Wales, and it happened quite spontaneously.

We had a stunning display of mushrooms varying in colour, shape and texture, supplied by Smithy Mushrooms and including some examples of the cultivation blocks made of straw and woodchip, with commercial saprophyte species such as shiitake and pink oyster growing out of them.

Our celebrity chef, Bill Pywell, worked his fingers to the bone preparing a range of different varieties of wild and cultivated fungi for us to try. A straw poll was conducted, but proved inconclusive; it seemed that each variety had its own fans. Amongst the cultivated varieties the delicate flavours of the cultivated pink and yellow oyster fungi *Pleurotus sp*. suited some, while others preferred the meaty shiitake *Lentinus edodes*. The wild varieties also ranged from the subtle, almost sweet chanterelle

Cultivated yellow oyster mushrooms

Cantharellus cibarius, to the earthy horn-of-plenty *Craterellus infundibuliformis*, to the sharp but wonderfully substantial hedgehog fungus *Hydnum repandum*.

These two weeks were colourful, sociable, tasty and laced with surprises. We will certainly be doing more work on waxcap fungi, a natural focus for more attention. What other branch of natural history in Wales can boast the best sites or species assemblages in the world? Most importantly, the Festival of Fungi convinced me that it is possible to combine the 'popular' approach successfully, creatively, and productively with the more 'serious' elements of conservation and field studies.

***John Harold** is Chair of Moelyci Management Board. He is an environmental consultant with particular interests in Lepidoptera and Fungi.*

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Feast in progress

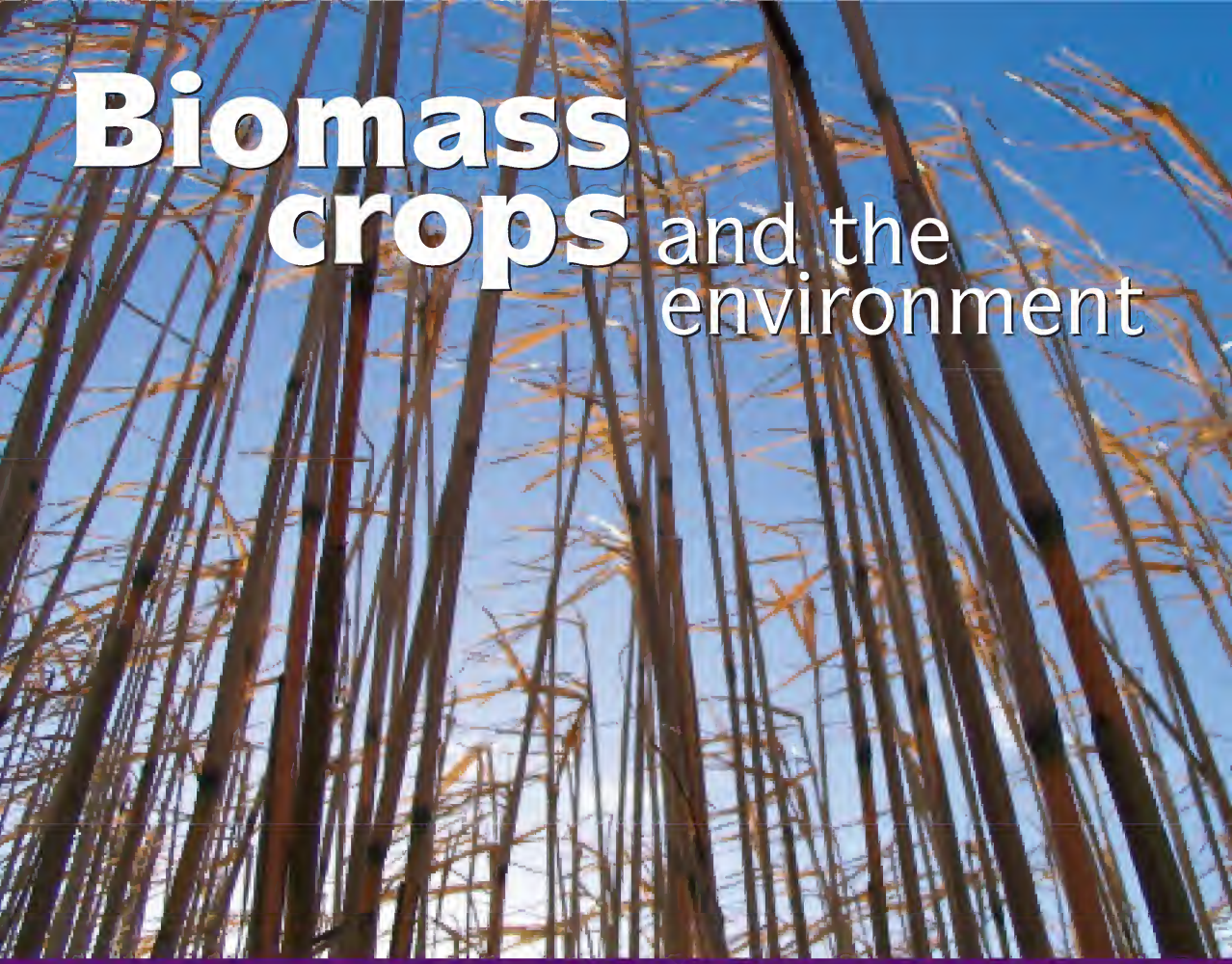
Hygrocybe chlorophana

Ffoli ar Ffyngau Moelyci

Roedd yna wledda, fforio, trafod a darganfod yng Ngŵyl Ffwng Moelyci eleni. Daeth dros gant o bobl ynghyd i chwilio am ffyngau, gan ddarganfod mwy na 124 o rywogaethau ar y tir; ond yr hyn a greodd y cynnwrf mwyaf oedd darganfod casgliad mawr o gapiau cwyr prin, a hynny ar dir a allai'n hawdd fod wedi diflannu o dan goed newydd! Cofnodwyd 22 math gwahanol o gapiau cwyr ar ddau gae cyfagos - cadarnhad bod rhai o laswelltiroedd Cymru yn rhyngwladol bwysig ar gyfer y ffyngau hyn. Roedd y gynhadledd yn fodd i ddysgu mwy am ecoleg ryfeddol y gwahanol fathau o ffyngau sydd o'n cwmpas, am y bygythiadau sy'n eu hwynebu, am y bylchau yn ein gwybodaeth, am yr anawsterau ynghylch dynodi a gwarchod safleoedd ffwng pwysig ac ynglŷn â diffyg adnoddau i gynnal astudiaethau hirdymor angenrheidiol.

Roedd y cyfan yn llwyddiant ysgubol. Dangosodd y bythefnos bod modd plethu gweithgaredd poblogaidd gyda'r agweddau cadwraethol a'r gwaith ymchwil mwy difrifol, gan greu gwir werthfawrogiad o gyfraniad ffyngau i'n cyfoeth amgylcheddol ac i'n bywydau ninnau.

Biomass crops and the environment



All photos: ADAS

Miscanthus in January

Farmers are being encouraged to diversify, and all of us are being urged to lead more sustainable lives and cut back on greenhouse gas emissions. Energy crops could help to address both concerns. ***CATHERINE HEYWOOD*** *describes the potential of two energy crops which could become a part of 21st century Welsh agriculture.*

Wales is predominantly agricultural. Government statistics released in June 2006 record the agricultural land area of Wales as 1,629,000 ha. (74% of total), 85% of which is grassland, be it permanent pasture or rough grazing, with 11% arable and the remaining 4% woodland or set-aside.

Agriculture is entering a period of change. New crops such as Miscanthus and Short Rotation Willow Coppice (SRC) are set to change cropping patterns and open up a new energy market to growers and the wider rural community. As custodians of the environment, the choices that farmers and landowners make have direct implications, both positive and negative, for the rest of the community.

The wider picture

Changes in the energy market have ensured that renewables have moved to centre stage. For UK and Welsh governments the key driver is

climate change. There is now no doubt that our climate is changing, and there are two ways in which we can respond. The first is through mitigation (reducing greenhouse gas emissions) and the second is through adaptation (responding to the impacts of climate change). Mitigation actions include changing the way we farm, by reducing carbon emissions for example, and by replacing processes that emit greenhouse gases with carbon neutral energy sources. Biomass crops such as Miscanthus and SRC fall into this category.

Biomass crops are widely regarded as being almost 'carbon neutral' because the carbon dioxide released when these crops are burnt as a fuel for heat and/or electricity is matched by the amount of carbon dioxide the plants absorbed when they were growing, through the process of photosynthesis. Hence, there is no net increase to carbon dioxide levels in the atmosphere. As a fuel, therefore, they are substantially more environmentally friendly than fossil fuels.

However, this doesn't give us the full environmental picture. The way the crops are grown, the land use they replace and the biodiversity they support all need to be considered for a good understanding of the environmental impact of introducing these crops into the Welsh landscape.

Agricultural inputs

Miscanthus and SRC are both long-term perennial crops. Miscanthus is not a UK native: the current commercial variety *Miscanthus x giganteus* is a sterile hybrid which does not produce seed. It is a fast growing, clump-forming, non-invasive grass with its origins in Asia. It is a long-term perennial crop with a potential productive life of 20 or so years. Many willow species are native to the UK where they have been part of the UK landscape for hundreds of years. Willow is a diverse family, with several hundred varieties readily available in Wales. The osier or basket willow *Salix viminalis* is a shrub native to the UK and it is the parental stock to many of the willow varieties planted for use as short rotation coppice. Its production is more comparable to agricultural cropping methods than it is to forestry.

Both crops are planted in the spring, Miscanthus as rhizomes and SRC as rods. Weed control is essential during the establishment phases (years 1 and 2) and herbicides are routinely used. Mulches or cover crops can be used to help control weeds, with the added benefits of soil improvement. On more fertile lowland sites fertilisers are not used in the establishment year. However, trials on willow in upland areas of Wales suggest fertiliser applications may be beneficial and the addition of lime is likely to be essential in these areas. Using organic wastes such as cattle slurry or treated sewage sludge can reduce the environmental impact compared to inorganic fertiliser applications. This gives the additional environmental benefit of waste disposal. Fertiliser applications are generally not applied after year three. As the crops approach harvest they translocate nutrients, back into the rhizomes in the case of Miscanthus, or into the stools in the case of

Miscanthus

Short Rotation Willow Coppice

SRC. Leaves drop in the winter adding organic matter and increasing soil nutrient status. Both crops have much lower agricultural inputs than conventional arable crops and the risk of ground water contamination by agro-chemicals is very low.

There are no yield-damaging pests and diseases in Miscanthus crops currently, though this is not the case in willow. SRC crops attract a lot of invertebrates and hence the crop is susceptible to a number of insect pests, most particularly willow beetles, which can cause considerable damage. The crop is also susceptible to diseases, the most important of which is rust. Willow plantations are composed of a mix of varieties to help reduce the impacts of willow beetle and rust. The need to use insecticides to control pest and disease attacks in SRC can be minimised by careful plantation design and varietal selection. Varieties are now being bred with resistance to pests and diseases in an effort to reduce dependence on fungicides and insecticides.

The crops also have what is known as a high energy ratio (in crop terms) of between 30 and 36:1, which means that the harvested crop contains 30 to 36 times more energy than that used in growing the crop.

Soil, water and nitrogen considerations

Both crops have a good root system and well-developed mechanisms for recycling mineral nutrients. The crops can be used as buffers along rivers, blocking surface run-off and phosphorus pollution, particularly at the bottom of slopes. As the crops are perennial, soil disturbance is reduced with the potentially damaging effect of yearly soil cultivations being avoided. The roots of the crops help bind the soil together, stabilising it and reducing the risk of soil erosion. Miscanthus has a C4 photosynthetic pathway and hence a very efficient conversion of radiation to biomass, and a higher dry matter yield potential than C3 grass cereal crops such as wheat or barley. Both crops use a large amount of water. The water use for SRC in the summer is higher than for all other forms of vegetation. In addition, SRC is deep rooting and can damage land drains. The water use for Miscanthus is lower, but still relatively high compared to cereal crops. High water use isn't necessarily a hydrological disaster but it is certainly something that needs to be considered, particularly if the cropped area is to be extensive and within a single water catchment. Whilst SRC has a particularly high water use, and can do well on wetter ground, it is unlikely that very wet land will be utilised for SRC production, due to the problems of ground conditions when harvesting in winter. SRC will grow well on most land where there is a reasonable level of rainfall and is therefore well suited to the Welsh climate. It would not do so well in drier areas of the country with shallow sandy soils, for example.

Site considerations

Miscanthus and SRC are fast growing, tall crops that can radically change the appearance of a site. As a result, it is important to give thought to the site's ecological and historical value as well as the visual impact of the crop on the landscape. For this reason it is currently a requirement that those proposing to grow SRC complete an environmental statement provided by the Forestry Commission. This will then determine whether a full Environmental Impact Assessment (EIA) is required.

The land use that is replaced by the energy crop will also have an effect on its environmental credentials.

For example, if willow were to replace an intensively grown arable crop, the environmental benefits could be high as soil cultivations, agro-chemical and energy inputs, and carbon emissions would be reduced and biodiversity potentially increased. However, it is unlikely that farmers would turn over their most productive land to these crops and would be looking to produce them on more marginal sites or set-aside land. The use of energy crops for land restoration on brown field sites is, from an environmental point of view, very promising. Whether economic returns can be made on such ground is probably less clear, though the economic case may be improved if the crops can be used to dispose of slurry and treated sewage sludge, which could provide an additional environmental bonus.

A nest in a plantation

Replacement of grassland with biomass crops may, however, have greater environmental implications. With 85% of Welsh agricultural land under grass this will be an issue in Wales. Ploughing up long-term grassland releases large amounts of carbon to the atmosphere and this adversely affects the greenhouse gas abatement objective of biomass production. Most of the carbon stocks in grassland are in the soil: ploughing opens up the soil and mixes in oxygen. The oxidation of carbon in the soil leads to carbon dioxide being released. In addition, nitrogen can also be released. The overall environmental and carbon impacts of replacing grassland will depend on a number of factors: the way the grassland was managed, how long the area has been under grass, the levels of biodiversity in the grassland system, and the cultivation methods used to establish the crop. There is a big difference between replacing a 50-year-old species-rich meadow, and replacing a 3-year-old intensively managed rotational grass crop, for example. Energy grass crops can be grown on set-aside land and can make farmers useful additional income in the process, though from an environmental perspective this may not be desirable. Again, much would depend on how species-rich the set-aside is and how long it has been set aside.

Transport also needs to be considered. In order to be both economically and environmentally viable, crops need to be grown close to where they will be used as a fuel. The harvested crop is a bulky commodity, and the further it is transported the higher the carbon and financial costs.

Impacts on biodiversity

Good planning and management practices include avoidance of priority habitats and untouched wildlife niches, and minimal use of insecticides and herbicides. These measures alone can go a long way to ensuring biodiversity is maintained or increased over previous land use. In addition, the crops need

to be part of a mix of farming land use, avoiding the creation of a monoculture.

Ensuring that biodiversity isn't negatively affected involves an understanding of the ecology of the current site and its surrounding area. Energy crops can create new habitats and opportunities for colonisation by many species of plants and animals. A number of studies have been carried out in this area. SRC has been found to be particularly species diverse, generally increasing biodiversity levels over previous land use. One study found that SRC crops held three times as many invertebrates as cereal crops. The ARBRE project, funded by the Department of Trade and Industry, was a four-year study looking at wildlife populations in commercial SRC. It found that SRC held a higher density of birds and more species than cereal crops. The age of the crop also had an effect on species. Most species preferred a young crop, whilst tit numbers increased as the SRC crops became more established. On the negative side, SRC was found to be potentially detrimental to some species that prefer a more open habitat.

Fewer bird species are found in Miscanthus crops, though young crops of Miscanthus offer patches of bare ground that are popular with birds such as skylarks and lapwings, and the crop offers a good over-wintering habitat. Both SRC and Miscanthus are harvested in winter, which is outside breeding times and summer migrants are not present. Two- to three- year old Miscanthus plantations have been used as over-wintering sites for birds, small mammals and invertebrates, suggesting immediate benefits to biodiversity.

So it would appear that younger crops of both SRC and Miscanthus have higher levels of biodiversity than older, fully established crops. Of the two, willow can be seen as being richer in biodiversity terms, with Miscanthus having biodiversity levels more comparable to arable crops, though with the added bonus of no insecticide and fertiliser requirements.

If properly planned, SRC and Miscanthus plantations have the potential to enhance the landscape and environment, reduce our dependence on fossil fuels and bring new markets to the rural economy. Farmers are the custodians of the environment and keeping them in business is key to keeping our rural heritage alive.

Catherine Heywood *is Renewable Energy Consultant for ADAS and CALU.*

Pwyso a mesur gwerth cnydau biomas

Faint o groeso sydd i gnydau cynhyrchu ynni, fel Miscanthus a helyg? Mae'r cnydau lluosflwydd hyn yn garbon-niwtral ac yn cynhyrchu 30-36 gwaith mwy o ynni nag a ddefnyddir wrth eu tyfu. Ond rhaid edrych ar fwy na hyn, os am bwyso a mesur eu heffaith ar dirlun ac amgylchedd Cymru. O'u plaid, mae'n wir bod angen llai o gemegolion ar y cnydau hyn, o'u cymharu â chnydau confensiynol. Ac mae eu gwreiddiau yn clymu pridd ac yn ailgylchu mwynau yn effeithiol iawn - cnydau addas, felly, i ddal dŵr ffo llawn ffosfforws ar hyd gwaelod llethrau ac afonydd. Gwyddwn hefyd eu bod yn cynnal cryn dipyn o fywyd gwyllt, yn enwedig yn y blynyddoedd cynnar. Ond, ar y llaw arall, rhaid defnyddio cemegolion i ladd chwyn, pryfed a ffwng ac i wrteithio a melysu pridd ar gyfer tyfu helyg yn yr ucheldir, ac mae helyg hefyd yn blanhigion hynod o sychedig. Mae'r cnydau hefyd yn swmpus a rhaid eu tyfu'n agos at y defnyddwyr os am osgoi costau uchel o ran cludiant a charbon. Gallai'r gwaith o aredig hen laswelltir ar gyfer tyfu'r cnydau hyn afonlyddu ar y storfeydd pwysig o garbon yn y pridd - a gollwng carbon deuocsid a nitrogen i'r amgylchedd. Ac oherwydd mai ar dir ymylol y bydd ffermwyr yn fwyaf tebygol o dyfu'r cnydau ynni, gallai cynefinoedd bywyd gwyllt pwysig gael eu difetha. Darlun cymysg, felly, o fanteision ac anfanteision. Ond mae'n ddigon amlwg bod angen cynllunio gofalus os am sicrhau bod cnydau ynni yn cyfrannu'n gadarnhaol at ein tirluniau a'n hamgylchedd, yn ein helpu i leihau dibyniaeth ar danwydd ffosil ac yn agor marchnadoedd newydd ar gyfer yr economi wledig.

Pob llun: Ysgol San Siôr

Y gwyllt wrth droed y Gogarth

Dal gwyfynod yng ngwarchodle Pensychnant
Catching moths at Pensychnant Centre

Mae'n rhaid bod plant Ysgol San Siôr, yn Llandudno, ymhlith y mwyaf ffodus yng Nghymru. Dyma ysgol lle mae'r tir a'r amgylchedd naturiol yn gystal, os nad gwell, ystafell ddosbarth nag unrhyw ofod o fewn pedair wal. Mae brwdfrydedd a mwynhad yr athrawon a'r plant yn golygu bod yr amgylchedd yn treiddio i bob rhan o fywyd yr ysgol ac yn rhoi profiadau bythgofiadwy i bawb. IAN JONES sy'n sôn am y gwaith byrlymus a gwefreiddiol sy'n digwydd wrth droed y Gogarth.

Mae Ysgol San Siôr wedi ei lleoli ar waelod y Gogarth yn Llandudno ac mae'n ymffrostio yn y gwaith amgylcheddol sy'n rhan annatod o fywyd yr ysgol. Gallwch weld peth o'r gwaith hwn ar wefan yr ysgol www.sansior.co.uk. Bob nos, er enghraifft, rydym yn gosod trapiau gwyfynod ar dir yr ysgol ac mae'n ras, bob amser chwarae, i weld pwy gaiff y cyfrifoldeb o'u hagor a gweld y cynnwys. Ers mis Mehefin, pan gychwynnwyd ar y cofnodion, rydym wedi dal 216 o wahanol rywogaethau drwy ddefnyddio 3 trap bach ac un trap Robinson, sy'n fwy o faint. Rydym yn ymweld â gwarchodle Pensychnant yn rheolaidd gyda'r trapiau ac yn cymharu'r mathau o wyfynod sydd i'w canfod mewn gwahanol gynefinoedd. A dweud y gwir, mae trapio'r gwyfynod wedi troi yn obsesiwn efo'r pennaeth hefyd ac mae yntau wrthi'n brysur yn trapio yn ei ardd gefn bob nos. Dyma i chi enghraifft wych o brosiect ysgol sydd wedi ysbrydoli'r plant a'r athro fel ei gilydd! Mae'r gwyfynod yn cael eu rhyddhau yn ddianaf, ar ôl iddyn nhw gael eu cofnodi gyda chamera'r ysgol. Caiff enwau'r gwyfynod eu cofnodi ar safwe'r ysgol.

Un tro, cawsom bnawn difyr iawn yn yr ysgol, yn berwi cwrw, siwgr a thriog du - gyda'r athro yn dwrdio'r plant am lyfu eu bysedd, fel y

Bwyd gwyfyn - cymysgedd o gwrw, siwgwr, triog du a rum!
Moth food - a mixture of beer, sugar, black treacle and rum!

gallwch ddychmygu. Wedyn berwi gwin coch (y rhataf yr oedd Tesco yn ei werthu!) ynghyd â siwgr a rhaff! 'Pam y fath gybolfa?' medde' chi. Wel, am ei bod yn agosáu at Noson Genedlaethol Trapio Gwyfynod. Ar ôl gorffen y gwaith cymysgu fe aeth y plant â'r cyfan i warchodle Pensychnant a mynd ati, cyn iddi dywyllu, i baentio'r hylif ar fonyn sawl coeden a gosod y rhaffau gwin dros frigau a llwyni. Yna disgwyl... gan fynd yn ôl at y coed bob hanner awr, gyda golau, er mwyn gweld a oedd yr hylif a'r rhaffau yn llwyddo denu'r gwyfynod... ac yn wir fe gawsom gryn dipyn o lwyddiant! Gweld pob math o wyfynod yn gwledda ac yn hedfan i ffwrdd yn sigledig! Yna, gwisgo sbectol haul a mynd i edrych a oedd y trapiau golau hefyd yn gwneud eu gwaith ac yn denu gwyfynod.

Mae gan blant chwilfrydedd cynhenid ynglŷn â'r byd naturiol sydd o'u cwmpas ac mae plant Ysgol San Siôr yn ffodus o gael athrawon sy'n annog y diddordeb yma ymhlith disgyblion o bob oedran, o'r dosbarth Meithrin i'r plant hynaf. Roedd hi'n braf i'r plant gael gweld lolo Williams a'i griw yn dod draw, y tymor diwethaf, i ffilmio eitem am erddi'r ysgol ar gyfer ei raglen newydd. Cawsom gryn dipyn o hwyl gyda'r ffilmio; ar un adeg doedd y criw ffilmio ddim yn gallu dod o hyd i lolo ac roeddwn innau wedi colli bron i ddosbarth cyfan o blant... ond doedd hi'n fawr o syndod i'w darganfod nhw i gyd yn un o'r gerddi, wrthi'n astudio ac yn gwirioni wrth i bry' lludw droi'n belen fach ddu..

Mae'r mathau yma o weithgareddau yn siŵr o ennyn diddordeb plant ac maen nhw'n sbarduno gwaith ysgrifennu, gwyddoniaeth a mathemateg nôl yn y dosbarth. Os am dystiolaeth darllenwch beth o farddoniaeth y plant ar y wefan. Un o'r gweithgareddau a fu'n destun rhyfeddod i'r plant oedd magu lindys Gwalchwyfyn y Penglog. Bu'r plant yn bwydo'r lindys, a'u mesur, yn ddyddiol. Fe welwyd y lindys yn troi'n chwilerod a'r gwyfynod wedyn yn deor. Roedd y plant a'r athro wrth eu boddau. Dyma wyfyn trawiadol yw hwn, gyda phatrwm penglog ar ei wegil ac yn gwichian fel llygoden. Pam fod y gwyfyn yn gwichian? Wel, am fod breninesau gwenyn yn gwichian; ffugio bod yn frenhines gwenyn y mae'r gwyfyn hwn, gyda'i gorff melyn a du, wrth iddo hedfan mewn i gwch gwenyn, dan wichian, a dwyn y mêl. Erbyn i'r gwenyn sylweddoli'r hyn sydd wedi digwydd, mae'r gwyfyn wedi ei heglu hi. Nid cwch gwenyn, ond dosbarth o ddisgyblion fu wrthi'n cynnig maeth i'r gwyfynod hyn wrth i'r plant eu bwydo pob pnawn efo hylif o fêl a dŵr.

Mae cyntedd yr ysgol hefyd yn gartref i drychfilod o ben draw'r byd. Mae cawell gwydr chwe throedfedd o uchder yn cartrefu pryfed heglog o Malasia sydd yn cicio ac yn chwythu os bydd rhywbeth, neu rywun yn gafael ynddynt. Mae yma hefyd bryfed pric enfawr du o Ecuador sydd yn cysgu drwy'r dydd, ynghyd â chongololo, neu'r neidr miltroed anferth o'r Affrig. Y

plant sy'n gyfrifol am ofalu amdanynt a rhoi chwistrell o fwyd iddynt bob dydd; mae'n rhaid eu bod yn gwneud yn iawn oherwydd bod y creaduriaid yn bridio'n llwyddiannus bob blwyddyn. Yn rhy lwyddiannus weithiau!

Gwalchwyfyn y poplys
Laothoe populi
poplar hawk moth

Yn y cyntedd hefyd mae dau deledu sydd wedi cael eu cysylltu â chamerâu bychain mewn blychau adar. Yn y Gwanwyn fe fydd y plant yn gwylio titw tomos las yn magu ei theulu. Ond sylweddolwyd llynedd bod gennym broblem, gan fod y plant ar eu gwyliau a'r ysgol ar gau tra bod y cywion yn magu. Eleni, felly, fe aethom ati i greu cysylltiad fyw drwy safwe'r ysgol. Bellach, gall unrhyw un o drigolion y blaned, os oes ganddo gyfrifiadur a chysylltiad rhyngrwyd, rannu a mwynhau'r profiad o wylio titwod San Siôr.

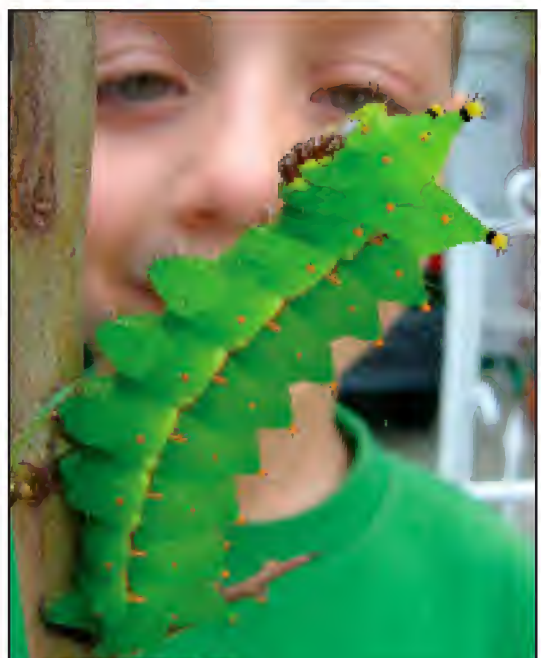
Mae'r ysgol wedi datblygu tair gardd gwbl wahanol ar dir yr ysgol. Mae'r ardd ffurfiol, gyda'i blodau lliwgar, wedi ennill cystadleuaeth 'Llandudno yn ei blodau' bob blwyddyn ers 1996, heblaw am un flwyddyn pan ddaeth y geifr i lawr o'r Gogarth a bwyta pob deilen werdd! Mae gan yr ysgol gysylltiadau â Barcelona ac yn dilyn ymweliadau â'r ddinas honno, a'r profiad o weld dylanwad yr artist Gaudi ar y lle, fe aethom ati i greu murlun 16 metr o hyd yn egluro sut y daeth y ddraig goch i fod yn symbol sy'n cynrychioli Cymru - sef stori Dinas Emrys.

Yn ychwanegol at roi ysbrydoliaeth gelfyddydol i ni, mae cysylltiadau Ewropeaidd wedi cyfrannu at waith gwyddonol yr ysgol. Rhoddais sialens i'r plant un tymor. A yw'r Gwanwyn yn cychwyn ar yr un amser ar draws Ewrop? Aethom ati i geisio datrys y broblem drwy anfon pacedi o gennin Pedr i ysgolion ar draws Ewrop. Pan oedd y cennin Pedr yn blodeuo roedd y Gwanwyn wedi cyrraedd ac roedd rhaid gadael i blant San Siôr wybod. A'r canlyniadau.... blodeuodd cennin Pedr yr Eidal ym mis Chwefror a chennin Sweden ym mis Mai wrth i'r gwanwyn weithio ei ffordd tua'r gogledd.

Mae gennym Ardd Loÿnnod Byw fendigedig. Yn ystod yr awr ginio bydd y plant wrthi'n cael hwyl ger y pwll, yn rhwydo madfallod dŵr, y sgodyn doctor coch, mursennod, gwas y neidr, malwod ac ati. Yn anffodus rydym yn cael problemau fandaliaeth o bryd i'w gilydd, a phenderfynwyd, ar un adeg, i osod cawell dros y pwll i atal ein byrddau picnic rhag cael eu lluchio i'r dŵr dros y penwythnosau. Er bod modd codi rhan o'r gawell i astudio'r creaduriaid, nid hon oedd y neges yr oeddem am ei throsglwyddo i'r plant. Byd natur dan glo oedd hyn.

Felly eleni rydym wedi taflu'r hen gawell ac mae 'ffens gwrth-ddringo' wedi ei chodi o amgylch yr ardd. Serch hynny cawsom hyd i'r holl fyrddau picnic yn y pwll yr wythnos ddiwethaf. Felly mae'r pennaeth wedi paentio 'paent gwrth-ddringo' ar ben y 'ffens gwrth-ddringo'. A wyddoch chi beth? Mae'n rhaid rhybuddio'r fandaliaid fod 'na baent yno rhag ofn iddynt faeddu ei dillad!

Yn yr ardd loÿnnod hon y caiff y trapiau gwyfynod a'r


Yn astudio lindys enfawr

Ôl-adain gopor
Amphipyra pyramidea
Copper underwing

Maenan groesog
Antitype chi
Grey chi

Tracking the Great Orme Wildlife

San Siôr school, situated at the foot of the Great Orme in Llandudno, is proud of its environmental work. Moth trapping - 216 species have been recorded - rearing caterpillars and keeping exotic insects excite the interest of pupils. Cameras record the breeding success of birds in nest boxes, and wildlife is prominent in the three different gardens, including a Butterfly Garden. The children prefer to learn outside, and are taken on regular trips to reserves such as Pensychnant. They are currently creating animations for the school's website **www.sansior.co.uk**, conveying environmental and social messages. Visit the website for more information.

trapiau tatws eu gosod. Tatws gyda cheudod yn eu canol yw'r trapiau olaf hyn - cânt eu gosod yng nghanol y llystyfiant ac yna, ar ôl tri diwrnod, rydym yn gweld pa drychfilod ac ymlusgiaid sydd ynddynt. Erbyn hyn mae gennym ysgol ar bob cyfandir yn cymryd rhan yn y prosiect yma a'r syniad yw eu bod yn anfon eu canlyniadau atom er mwyn i ni gael dysgu pa drychfilod sy'n byw mewn gwledydd eraill. Mae'n llawer gwell nag edrych mewn llyfrau. Yn ystod y tymor diwethaf, ymunodd ysgol o Sri Lanka, India, De'r Affrig a Seland Newydd gyda'r prosiect. Rydym yn cael hwyl gyda'r ysgolion tramor hyn mewn ffyrdd eraill hefyd - un flwyddyn, pan gollodd Cymru yn erbyn Awstralia mewn gêm rygbi anfonwyd sialens i ysgol yn Awstralia i weld pwy oedd â'r malwod cyflymaf! Cawsom gystadleuaeth frwd. Enillodd y falwoden Gymreig yn hawdd - mewn 5 munud fe deithiodd 83cm o gymharu â'r 63cm a deithiwyd gan y falwen o Awstralia. Llwyddiant ar lwyfan y byd!

Mae'r ardd hon hefyd yn cynnwys bocsys ystlumod ac adar a hefyd nifer o focsys pwrpasol sydd i fod i ddenu trychfilod. Mae gennym hefyd adnoddau o fewn yr ystafell ddosbarth, ar ffurf bocsys adnoddau lle gall y plant nôl llyfrau, siartiau adnabod ac offer arsylwi trychfilod. Llynedd, fe gafodd yr ardd ei chydnabod fel yr *Ardd Bywyd Gwyllt Orau* gan Brosiect Gerddi Ysgolion Parc Cenedlaethol Eryri.

Mae tir yr ysgol hefyd yn cynnwys gardd drychfilod a phwll ychwanegol ac mae clychau'r gog yn garped glas dros rannau o'r safle yn ystod y gwanwyn.

Eleni rydym wedi derbyn baner Ysgol Eco, er nad oes gennym bolyn i'w arddangos eto. Fel ysgol Eco rydym yn ail gylchu papur ac er mwyn ei wneud yn fwy diddorol rydym yn dangos y canlyniadau ar ffurf eliffantod bach. Hyd yma, yn 2007, rydym wedi ailgylchu papur o'r un pwysau â 44 o eliffantod bach (4,400kg mewn geiriau eraill). Mae gennym thermomedr enfawr ar flaen yr ysgol ac rydym yn gwneud pob ymgais i arbed ynni.

Mae'n well gan blant, fel oedolion, ddysgu mwy drwy fod allan, lle cânt ddefnyddio eu holl synhwyrau, yn hytrach na bod mewn dosbarth. O ganlyniad i hyn rydym yn mynd â'r plant allan yn rheolaidd ar ymweliadau maes, i leoedd fel Gwarchodlle Pensychnant, RSPB Conwy, ac yn mynd â nhw i fwynhau gweithgaredd awyr agored, fel canŵio ar Lyn Geirionnydd a cherdded a beicio tra'n aros yn Rhyd Ddu. Yn yr un modd mae athrawon yr ysgol yn cael cyfleoedd i fynd i ymweld â'n partneriaid, i ysgolion sydd mor bell i'r gogledd â Norwy a chyn belled i'r de â Sardinia. Profiadau unigryw i bawb felly.

Yn ddiweddar mae'r plant wedi dechrau creu animeiddiadau i'r safwe sy'n cyfleu negeseuon cymdeithasol ac amgylcheddol. Gobeithio cewch gyfle i ymweld â'n safwe **www.sansior.co.uk** i ddarllen am ein gwaith.

Ian Jones *yw Pennaeth Ysgol San Sior.*

Mike Henchman/Natural England

Wild Harvest

a walk on the wild side...

Hawthorn

*Forager **YUN HIDER** has spent the last 12 years learning about edible wild plants. Working with Michelin-starred chefs, he's been out 52 weeks a year, rain or shine, providing them with an array of Wales's finest wild fruits, herbs and vegetables. Here he describes the spirit of adventure which accompanies his forages.*

Walking along hedgerows, across fields and through trees, looking from side to side, scouring the vista for edible bounty - this is my job. It is a very special experience - the contact with nature, and the element of the unknown, play a very important part for me. I never know what I will find: expecting nothing, whatever comes is a bonus.

I've had the privilege of foraging in Wales for over a decade now. Working with a handful of chefs, my challenge has been to track down a selection of wild herbs and vegetables that have exceptional qualities. Taste is obviously a key factor, but the shape and texture of the plants are also very important.

As always, first impressions count. Once picked, the way in which the plants are managed is very important. From carefully forming bunches to gently placing them in cool bags, it feels necessary to treat them with great respect. I always get particularly excited as I gather sloe berries

Derek Ratcliffe/Natural England

and rosehips. The contrast of colour is spectacular. The deep purple against the blood red can be quite beautiful. These precious jewels of nature, sometimes collected at dawn, can be destined for kitchens as far afield as New York, so every step is taken to ensure that they arrive in perfect condition.

When out foraging, don't be put off if nothing is found straight away, look behind things and around corners. Stop for a moment and listen. The wind in the leaves and the sound of birds calling, it's all part of the experience, an impression that stays with you long after you return to the humdrum reality which confines so many of us.

Then suddenly you spot something familiar, a favourite plant, tree or fruit. Settling down to harvest these finds is a wonderful experience. Crouched by the ground, rummaging through the foliage or clambering through the branches of a tree, you can find yourself in all kinds of positions when searching out and selecting the finest specimens.

Foraging for this wild harvest brings numerous benefits, not just as food but also medicine. A handful of nettles mixed with a bunch of wild garlic makes for delicious soup. These are two very common plants with a host of medicinal qualities. Nettles are said to help women with PMT and men with hair loss. Elderflower not only makes the ever-popular elderflower champagne, the flowers can be used to make a face wash to clear freckles and cure sunburn. Wild strawberries are a real treat to find and, if you're lucky, you'll know a hedgerow where they can be collected in profusion. Chewing the strawberry leaf will freshen the mouth and clean your teeth. They are also said to strengthen your gums.

Gorse flowers with their wonderful scent of coconut can make one of the best wines. Gorse bushes were traditionally burnt at midsummer, and blazing branches were removed and carried round the herd to bring health to the cows for the coming year. Rosehips are a truly beautiful fruit that are said to contain four times as much vitamin C as blackcurrant juice, and twenty times as much as oranges. Homemade rosehip syrup is vastly superior to the manufactured variety and makes a great sauce for ice

Yun Hider

Rosehips

cream. A real favourite of mine is hawthorn: the very young leaves, best picked in April, have a pleasant nutty taste. Come May, we get the spectacular blossom which can be used to make wine.

Lost in this kind of primitive activity, thoughts start to drift and a form of meditative state kicks in... time ceases to be of concern, a potential hazard when collecting along the seashore. Watch out for the tide - it takes no prisoners. Always be one step ahead. Look for escape routes and keep a watchful eye on the water level. It may look fine where you are, but just around the corner things can be so very different. What was an easy stroll can turn into a frightening scramble, and clambering back to safety is not always as simple as one would hope. What you thought might be a paddle, just getting your feet wet, can turn into a full-on wade or swim against a tide, not an experience to be taken lightly: lives have been lost for less.

Nature must be taken very seriously: one is often out alone in all manner of terrain. A gentle slope can suddenly turn into a cliff edge, what was a gentle stream one day can be a raging torrent the next - all part of the fun, but care must be taken at all times.

This may all sound alarming, but it is in fact these extreme conditions that I find so compelling. The force of nature is a wonderful thing, one minute a tranquil scene, the next all change... Once, as I made my way along a regularly driven route, I saw the river had burst its banks and the water in front of an old bridge was about 18 inches deep. Not deterred, as I was driving a diesel car, I pushed on through the water, over the bridge and off through more of the floodwater. On my return an hour later, the bridge had gone.

On another occasion, I was out collecting wood sorrel in a forest normally familiar to me, but it was two in the morning, an order had gone astray and, being destined for a royal event, it was necessary to re-gather the herbs and drive them directly to London. We'd had some ferocious winds the previous day. Many of the trees along the path had been blown over, and some were caught up in their neighbours. As I set off into the now still, thick black night of the conifer forest, I was startled when I shone the torch towards the sky to find that there was a massive tree trunk above my head, its bark almost reptile-like, glistening, dark and scaly. Disorientated by these fallen trees, I found myself lost in what was once familiar territory. It's only a small forest, so I must admit I was intrigued by how difficult it seemed to find my bearings. The problem was that there was so much in my way, from uprooted trees to brambles and ditches, that by the time I had cris-crossed the forest a couple of times, I was starting to get weary. I made it out eventually but I was reminded of how quickly a perfectly straightforward mission could turn into quite a drama.

It is of course very important to understand that one cannot afford to try anything unless certain what it is. A young couple was over in Ireland a few years back looking for the wild carrot. They made an incorrect identification and the man died. My rule is you only eat something if you know somebody who has tried it

Mandy Marsh

Byw ar gynnyrch naturiol

Ychydig o bobl, mae'n siŵr, all frolio eu bod yn ennill bywoliaeth drwy chwilota am fwydydd o'r gwyllt. Bu Yun Hider yn gwneud hyn ers deuddeg mlynedd, gan gasglu pob math o blanhigion bwytadwy ar ran cogyddion blaenllaw. Mae ei ddail suran coed a'i aeron drain gwynion yn cyrraedd ceginau mor bell i ffwrdd â Llundain ac Efrog Newydd! Mae'r profiad o chwilio am blanhigion mor bwysig â'r cynnyrch ei hun ac wrth fod allan ymhob tywydd caiff ei atgoffa'n barhaus o rymoedd rhyfeddol yr amgylchedd ac am y gofal y mae'n rhaid ei gymryd. Buan iawn y gall mannau cyfarwydd droi'n anghyfarwydd ac mae gofyn bod yn wyliadwrus bob amser. Fel un sy'n ennill ei fara beunyddiol ar gorn cynefinoedd gwyllt mae'n gresynu nad oes digon o'r ardaloedd hyn ar gael, a bod y darnau sy'n weddill yn cael eu herio'n dragwyddol gan bwysau bywyd cyfoes. Yn ei dyb ef, mae'r amser wedi dod i ganolbwyntio ar wella adnoddau mewn lleoedd sydd eisoes wedi datblygu, yn hytrach na pharhau i aberthu ein cynefinoedd gwyllt, gwerthfawr a bregus.

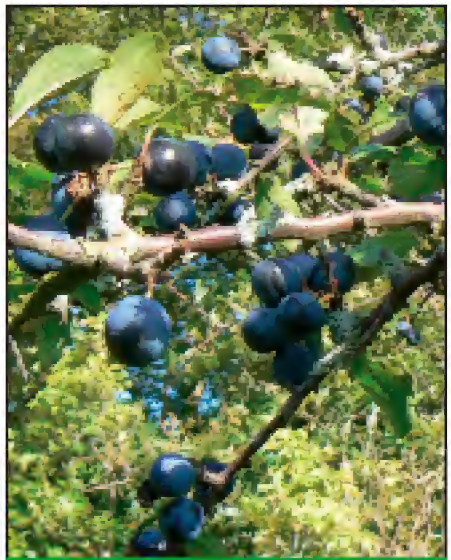
before and will eat it in front of you. Otherwise it is often necessary to observe a plant through its cycle within the seasons. Only like this can one properly study its leaves and flowers.

When out collecting different plants, you must have permission from the landowner and never collect anything unless it is growing in profusion. Do not dig up the roots, and pick carefully so as not to damage the surrounding foliage. Wild flowers are protected and must not be picked.

Searching out this produce has shown me how precious our wild habitats are, from hedgerows to small enclaves of scrub, paths along the coast to tracks through the forests. There are many worthy projects where individuals and government organisations are setting aside areas as wild habitat, but there can never be enough. With our ever-expanding population and demand on resources, these habitats are constantly being challenged. Even in National Parks, patches of wild have to be sacrificed to cater for the increasing numbers of tourists, with tracks widened and facilities created. I'm not a specialist in environmental issues, but it seems logical that we should now concentrate on making the most of our already developed areas and avoid any further intrusion on these truly precious and ever dwindling wild habitats.

I was inspired some 20 years ago by the fishermen on the north coast of Ibiza, who used to bring their catch back to the beach to be cooked by their wives in the family restaurant. The smell of the grilled fish drifting across the bay is something I will never forget. Wandering along the Pembrokeshire coast collecting wild herbs and sea vegetables has given me a taste of their lifestyle. I feel privileged to have the opportunity to get this close to nature and consider myself indebted to it. It is now my responsibility to do everything I can to help protect these plants.

Mandy Marsh



Sloes

***Yun Hider** harvests from the wild in Pembrokeshire. He has developed his foraging into a small, sustainable cottage industry.*

Dragonflies
on the move

Allan Brandon

Black-tailed skimmer

Female large redeye

Dragonflies and damselflies are changing their distributions in response to our warming climate in the same manner as some other insect groups. Several resident British species with more southerly distributions are undergoing range expansions, with breeding populations occurring farther north and north-west than previously known. Also, new species are arriving from the continent to become part of the British fauna for the first time, as ALLAN BRANDON explains.

Although north Wales is a relatively small area, recent range expansions of some species of Odonata can be clearly detected from our records. Two resident British hawkers, or aeshnids, the blue emperor dragonfly *Anax imperator* and migrant hawker *Aeshna mixta*, which were unknown in north Wales a decade and half ago, have spread considerably north-westwards in recent years. They are now to be found breeding in many suitable lowland ponds and lakes across the region. The black-tailed skimmer *Orthetrum cancellatum* is actually in the process of colonising north Wales. In 2000 I found only the second breeding site in Cheshire and the species had not then been recorded farther west. In 2002 Andy Harmer made the first north Wales sighting at a small pond between Wrexham and Holt. But in the last two years its range has expanded rapidly and I have found it at several ponds across Denbighshire and Flintshire, with successful breeding proved at Llyn Helyg south of Prestatyn.

But this range expansion of resident species is not always so straightforward. The ruddy darter *Sympetrum sanguineum* appears, possibly with the help of an influx from the continent, to have pushed into north Wales in the 1997-1999 period with numbers breeding even as far west as Bardsey Island in 1998[1]. Thereafter it lost ground and in recent years there are records only for the Wrexham area Conversely, there are

Allan Brandon

Male brown hawker

resident species which are reluctant to venture very far into north Wales despite the availability of apparently suitable breeding sites. The brown hawker *Aeshna grandis*, which has long been a familiar sight at Flintshire and east Denbighshire ponds, and even a widespread species in lowland Ireland, seems to find the Clwydian Range a barrier to moving farther west. Similarly, the large redeye (or red-eyed damselfly) *Erythromma najas*, which had significantly expanded its range westward and north-westward from England into the Welsh Borders in the last two decades, is currently reluctant to venture farther west than a few Flintshire ponds. In south Wales a new colony for the species is reported by Steve Moon from Cardiff Bay this June, but whether a series of hard winters will wipe it out remains to be seen.

New British colonisers

Three species of damselfly have made it across the channel and recently colonised south-east England. These are the migrant spreadwing (or southern emerald damselfly) *Lestes barbarus*, western willow spreadwing *Lestes viridis* and small redeye *Erythromma viridulum*. Of these, the small redeye is the one most likely to get to north Wales in the next few years. It was first recorded in south-east England seven years ago but since then has pushed across country at a startling rate

Allan Brandon

Male migrant spreadwing

Female western willow spreadwing

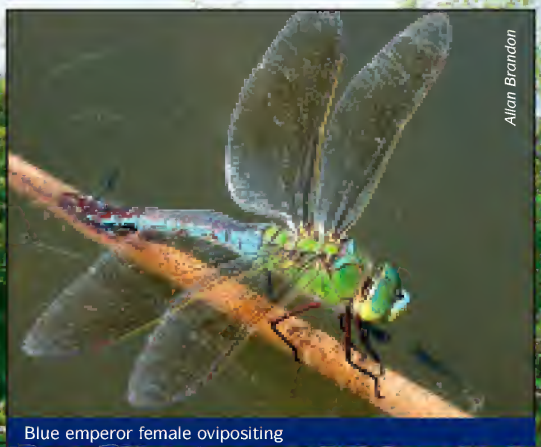
Small redeye

and has already reached the Midlands.

Rather like the painted lady butterfly or the silver Y moth, those stronger-flying dragonflies in southern Europe with migratory instincts may be dispersed over wide areas of Britain from July onwards, especially following strong southerly or easterly winds. These invasion years are occurring more often recently but so far there have been very few sightings from north Wales. Most of these continental migrants are darters (species of *Sympetrum*). Migrations of red-veined darter *Sympetrum fonscolombii* into Britain occur in most years and the species is one of those beginning to maintain breeding populations, especially at coastal sites. Steve Moon reports that such may be the case at Kenfig NNR, Glamorgan, around which area sightings have increased since 2000, with the exception of 2004. In north Wales a winter nymph was netted in February 2001 at a coastal pond at the Point of Ayr Colliery and an adult was recorded by Iris Cotgrove at Criccieth in

Carol Cockbain

Male lesser emperor at Shotton Steelworks



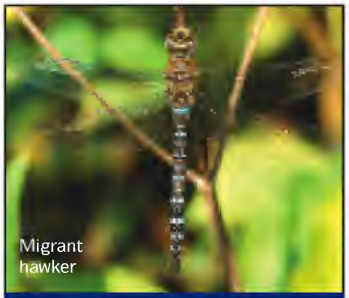
Allan Brandon

Blue emperor female ovipositing

Joyce Fleur

Malltraeth Marsh, Anglesey

Allan Brandon



Migrant hawker

Gwesynnod Cymru - y llanw a'r trai

Beth sy'n cyfrif am ledaeniad gwesynnod a mursennod i ardaloedd gwahanol o Gymru a Phrydain? Mae'n hawdd cyfeirio at gynhesu byd eang ond nid yw'r patrwm bob amser mor eglur. Weithiau ni cheir unrhyw ledaeniad, ar waethaf presenoldeb cynefinoedd addas. Gwelwn hefyd batrwm o lanw a thrai yn nosbarthiad y creaduriaid hyn mewn ardaloedd gwahanol, er nad ydym yn gallu egluro'n hawdd pam fod hyn yn digwydd.

Mae'n siŵr y bydd mwy o wesynnod mudol yn dod i Gymru yn y dyfodol oherwydd cynhesu byd eang. Eisoes mae 3 math o fursen wedi croesi Sianel Lloegr yn ddiweddar ac wedi sefydlu yn ne-ddwyrain Lloegr. Mae'r ymweliadau hyn gan wesynnod a mursennod mudol yn digwydd yn amlach y dyddiau hyn ac mae ambell un, fel y picellwr gwythien-goch, yn dechrau magu yma yng Nghymru mewn lleoedd fel Gwarchodfa Natur Genedlaethol Cynffig.

References

1. Stansfield, Steven, 1998. *Bardsey Observatory Report* No 42.
2. Wallace, Ian, 2001. *Dragonfly News*, No. 43, p. 34

2002. 2005 and 2006 have been very good years for records of this species in Britain with several reported sightings in Lancashire and Cheshire; Steve Stansfield found a female on Bardsey Island on the 24th September this year.

No other vagrant darter species have yet been picked up in north Wales this century, although in July this year Ian Standen photographed a yellow-winged darter *Sympetrum flaveolum* in Radnorshire alongside numerous sightings of red-veined darter. As the former darter has been found farther north in Britain there is a good chance of seeing it in north Wales in the future. Perhaps the most exciting news is that the lesser emperor *Anax parthenope*, another fairly regular vagrant to southern Britain from the Mediterranean region in recent years, was found in north Wales for the first time this year. A male was caught in a mist net at Shotton Steel Works on 23rd July and identified by Rob Cockbain. It is a species that has maintained a pioneering breeding population in Cornwall since 1999 and may also be present at Marazion Marsh, south Glamorgan, though positive proof of breeding from there in the form of exuviae (empty larval skins) has not been established. Even though such colonies are subject to the vagaries of the British weather and could easily be wiped out by one or more severe winters, influxes of all the vagrant dragonflies into Wales are likely to become more common as global warming progresses.

(credit)

Yellow-winged darter

Submit records

As these vagrant dragonflies may turn up almost anywhere, please give your local darters and emperors a second glance next summer. If you are indeed lucky enough to find one in north Wales I would be very pleased to receive your record at **Allan@rowenconwy.wanadoo.co.uk** along with a photograph or detailed description to allow confirmation of its identification. Further information on British dragonflies and damselflies (odonates) can be found on the British Dragonfly Society website. A summary of UK migration during 2005 is contained in: A J Parr. 2006. 'Migrant and dispersive dragonflies in Britain during 2005', Journal of the British Dragonfly Society, Vol. 22, 13-18. To help with your field identifications an excellent book just published is *Field guide to the Dragonflies of Britain and Europe*, edited by Klaas-Douwe B Dijkstra and illustrated by Richard Lewington (reviewed in *Natur Cymru* 20 p45).

***Dr Allan Brandon** is North Wales Dragonfly Recorder for the British Dragonfly Society.*

All photos: Mark Nason

Slate waste and green waste meet

New techniques recover wildlife habitats

Slate and other mineral wastes cover large areas of the country where mining has been, and often continues to be, a landscape-shaping industry. How do you soften and re-vegetate some of these tips? Sterile and expensive reclamation projects involving bulldozers and topsoil are being replaced by schemes based on aiding natural processes, through ecological research, and... compost! ***MARK NASON*** *reports.*

Experimental plots at Blaenau Ffestiniog, December 2005

Slate dominates the cultural and visual landscape in many parts of north Wales and quarrying drove the development of communities and culture, particularly in Bethesda, Blaenau Ffestiniog and Llanberis. It has been estimated that 98% of slate extracted from the ground ends up as waste and although new equipment and techniques are lowering this figure, the mineral waste legacy of north Wales' 200-year industrial heritage remains. In Gwynedd alone, there are an estimated 730 million tonnes of slate quarry waste, with a further 6 million tonnes produced every year. Attitudes to this integral part of the Welsh landscape differ enormously; some visitors to north Wales speak of derelict and active quarries as a blot on the landscape, but many local people feel that their environment would be 'naked without them'.

Slate quarries have even inspired art and poetry by the people who have visited them. One such tourist, Alfred Lord Tennyson wrote:

He spoke; and, high above, I heard them blast
The steep slate-quarry, and the great echo flap
And buffet round the hills, from bluff to bluff.

The Golden Year, 1846

Lichen is an early coloniser

Pogonatum urnigerum urn haircap

Slate has been quarried since Roman times, but until the mid 1700s quarries were shallow and usually worked by individuals for their own needs. The oldest tips of significant size are between 150 and 200 years old and consist of large blocks and waste from cutting sheds, cut entirely by hand and often transported by mine cart to be tipped from the end of finger-like projections of slate waste known as Pen Clips. It is these tips that present the greatest challenge to colonising vegetation, as there is no soil to provide nutrients; despite high rainfall, plants that establish in small patches of fine material are prone to summer drought.

Ecologically, these blocky waste tips are extremely interesting since their colonisation by plants mimics processes of primary succession, where vegetation first establishes on bare land, for example following the retreat of glaciers or the cooling of volcanic lava. Arguably it is worth preserving blocky slate waste simply to study these processes. Among the first colonisers of the surface of the rocks of both natural block scree and blocky slate quarry waste are slow-growing lichens such as *Parmelia glabratula*, *Lecanora campestris*, and *Buellia aethalea* (that largely lack common names!) and woolly hair moss *Racomitrium lanuginosum*, which is also very tolerant of drought. Where there is an accumulation of moisture-retaining fine material, other mosses such as urn haircap *Pogonatum urnigerum* and ferns, most notably parsley fern *Cryptogramma crispa*, are among the first colonisers.

At Penrhyn quarry we have noticed that the small seeds of wood sage *Teucrium scorodonia*, silver and downy birch *Betula pendula* and *B. pubescens*, and grey willow *Salix cinerea* often germinate directly in pockets of moist moss. Although summer drought may mean that their seedlings only survive for one or two years, during their brief life they shed leaves that will rot down amongst the slates and begin the long, slow process of soil formation. The colonisation of plants with bird-dispersed seeds is generally much slower but they can be found under established birches and willows, and scattered oaks are seen on many older tips. Heathland plants are generally restricted to places where the waste slate has been compacted into a less porous substrate, e.g. on the bed of old tramways.

In some cases it is desirable to intervene and try to accelerate the slow colonisation of slate quarry waste by plants, for example to restore connectivity between patches of heather moorland severed by quarry expansion. Historically, planning permission to expand existing quarries was granted without requiring restoration to a beneficial after-use. Now, planning applications require environmental impact assessment and most are granted only if restoration is planned. With financial help from the European Commission under the Life-Environment programme,

the University of Wales, Bangor, has been studying how best to restore slate quarry waste to habitats of conservation value. In a six-year partnership with Alfred McAlpine Slate Ltd., we have set up trial sites in Penryhn Quarry (Bethesda) and in Ffestiniog Quarry (Blaenau Ffestiniog). Alfred McAlpine Slate Ltd. is committed to restoration and remodelling landscapes that are affected by quarrying and has budgeted £3.5 million over the next 25 years for this purpose.

It is not always easy deciding what habitat to restore slate quarry waste to. For this reason we have surveyed adjacent plant communities in Blaenau Ffestiniog and Bethesda and sought extensive advice from many regulatory bodies and conservation agencies, most notably the Countryside Council for Wales. One thing is clear: industrial features within slate quarries should be retained for their heritage value. Slate quarries contain rare examples of Victorian engineering, such as water balances and inclines, and old buildings are sometimes occupied by scarce birds such as peregrine falcon *Falco peregrinus* and chough *Pyrrhocorax pyrrhocorax*. Bats, including the rare lesser horsehoe bat *Rhinolophus hipposideros* may occupy derelict quarry buildings or caves within slate quarries. A variety of objectives for quarry restoration might be considered, among them biodiversity conservation, landscape aesthetics, amenity and recreation. Potential future developments (i.e. re-working of quarry waste for secondary aggregates) should also be borne in mind. What is appropriate and practically achievable at a particular site depends on many factors including altitude and climate, neighbouring vegetation and the availability of soil-forming materials.

Finding the right compost

Using composts created from household and commercial wastes as a substitute soil in quarry

The plots in summer 2006

Producing compost in pods

restoration schemes has the potential to address many pressing environmental issues, and avoid environmental problems associated with imported topsoil. Biodegradable waste in landfill sites decomposes without oxygen; the result of this anaerobic decay is that carbon once contained in living organic matter is released to the atmosphere as methane. Methane is a potent greenhouse gas with a global warming potential some 20 times that of carbon dioxide. Composting organic wastes does not produce methane and the finished compost can be used to add nutrient- and water-holding organic matter to bare quarry waste tips without introducing weed seeds.

Behold this compost! Behold it well...!
It grows such sweet things out of such corruptions...
Walt Whitman (1819-1892), This Compost

However there is a problem with using composts to try and create, or re-create, Welsh upland habitats, particularly heather moorland, on bare slate quarry waste. Compost has a neutral to slightly alkaline pH and in comparison with Welsh upland acidic soils it is very fertile. For example, amounts of the essential plant nutrient phosphorus can be 200 times greater in compost than in heathland soil. In general, fertile soils favour the fastest growing species, so preventing the co-existence of a large number of species, and there is a danger that spreading fertile composts will result in species-poor grassland.

We have been composting a variety of household and industrial wastes according to recipes designed to produce compost suitable for biodiverse target habitats. We chose to use portable in-vessel composters (the EcoPOD© system) to allow us to control the composting process with a high degree of precision without producing leachate and unpleasant smells. Composting is a fascinating process. During the first few weeks, large numbers of bacteria and fungi consume 'labile' compounds, such as sugars and amino acids, contained in the organic matter being composted. During this feeding frenzy so much energy is released by their break-down that the temperature of the compost increases to 65°C or above. The high temperatures sanitise and sterilise the compost by killing weed seeds and potentially harmful bacteria such as *E. coli* and Salmonella. When the supply of labile compounds declines, the compost cools and white rot (basidiomycete fungi) continue the slow degradation of compounds such as lignin, which may take as long as 5,000 years to be broken down completely. As the compost cools, its texture and colour change and after approximately three months the finished compost resembles soil.

We have composted about 10 different mixtures of organic and mineral wastes at our trial sites in Blaenau Ffestiniog and Deeside. These include green waste, tertiary treated sewage sludge (biosolids), de-inking paper pulp (a by-product of recycling paper) and fine grain slate mineral fines. Green waste and biosolids contain large amounts of essential plant nutrients such as nitrogen, phosphorus, potassium and calcium. Paper pulp and mineral fines do not contain nutrients and are used to dilute the nutrients in compost whilst increasing water-holding capacity and improving physical structure. We are demonstrating that by carefully mixing these wastes, the characteristics of compost can be matched to target species and habitats.

Our finished composts have been spread on bare slate waste according to a robust experimental design. This allows us to assess the performance of different mixtures before deciding which might be suitable for restoring large areas of quarry waste. At Blaenau Ffestiniog, our experimental plots are

Heather seedling

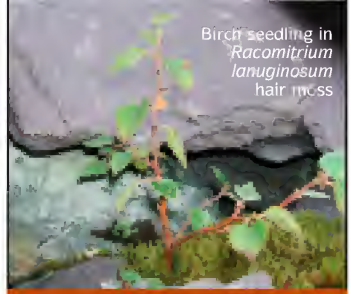
clearly visible from the A470 over the Crimea Pass as it descends into the town from the north. The plots have a patchwork-like appearance and it is clear that some composts are supporting lots of vegetation whilst others look bare. The green plots are covered with lush growth of our target upland grasses, common bent *Agrostis capillaris* and sheep's fescue *Festuca ovina* and from the road it might be concluded that this compost has performed best. On closer inspection, however, you can see that the bare plots support patchy grass cover together with heather *Calluna vulgaris* seedlings, which have not become established on the fertile, grass-covered plots. Our recommendation would be that, in order to encourage initial establishment of heather, the fertility of compost must be kept low.

Having tested different mixtures of waste materials, our next step is to restore larger areas to demonstrate the validity of our techniques. Over the next few months we will be spreading our customized compost over approximately 0.5 ha of bare slate quarry waste and seeding the slope with a mixture of native upland grasses and heather. We know that the grasses will grow, but not flourish, on the infertile compost. We will monitor the site carefully and watch for the heather seedlings that will germinate early next autumn. In the process of creating our compost we have stopped several thousand tonnes of organic wastes from going to landfill sites and instead used them to create a safe, ecologically appropriate resource for slate quarry restoration.

Further reading

http://www.bangor.ac.uk/ies/TWIRLS/TWIRLS_home.htm
http://www.amslate.com/amslate_home/about.asp
http://www.llechicymru.info

Dr Mark Nason *gained his BSc (Hons) in Ecology and PhD (decomposition of leaf litter and soil formation) at the University of Wales, Bangor. His current research interests include habitat restoration using composted wastes and the fate of metals, organic pollutants and endocrine disruptors ('gender benders') during in-vessel composting. He can be contacted* on bsse04@bangor.ac.uk



Birch seedling in *Racomitrium lanuginosum* hair moss

O Wastraff i Werddon

Diwydiant gwastraffus iawn yw chwarela. Amcangyfrifir bod 730 miliwn tunnell o wastraff llechi yng Ngwynedd yn unig. Mae nifer o'r tomennydd yn bentyrrau sylweddol o flociau craig a luchiwyd dros ymylon 'clipiau' chwarel. Mae'r hynaf yn eu plith yn 150-200 mlwydd oed. Dim ond yn araf iawn y bydd llystyfiant yn ailsefydlu ar y tomennydd hyn - er y gall coed bedw a helyg, yn y pen draw, dyfu yn y pocedi o fwsogl llaith sy'n datblygu rhwng y creigiau. Weithiau, mae angen cyflymu'r broses hon, ac mae amodau caniatâd cynllunio yn gofyn yn gynyddol am asesiad ecolegol a chynlluniau ar gyfer gwaith adfer tirlun. Rhaid cofio bod angen cyflawni sawl amcan wrth adfer olion chwarela - cadw nodweddion hanesyddol yn y tirlun, gwarchod cynefinoedd i fywyd gwyllt fel ystlumod ac adar, a chynnal cyfleoedd hamddena hefyd. Drwy gymysgu gwahanol fathau o wastraff domestig, mae Prifysgol Bangor wedi creu compost mwy asidaidd ei natur a fydd yn helpu llystyfiant nodweddiadol i ailsefydlu'n gynt ar domennydd llechi. Os bydd y dechneg yn llwyddiannus, bydd y Brifysgol wedi arbed tunelli o wastraff rhag mynd i safleoedd tirlenwi ac wedi ei ddefnyddio, yn lle hynny, i greu deunydd diogel a defnyddiol ar gyfer adfer rhai o'n tirluniau diwydiannol.

Learning on the farm

Nick Rebbeck

The 2001 foot and mouth disease outbreak signalled a change of direction for many farmers. For NICK REBBECK, who had farmed organically for nearly 30 years, it was a chance to share his passion for farming with a young generation in danger of losing touch with this most vital and basic industry.

Growing crops and raising livestock is hard but rewarding work, and my three decades on the family farm near Lampeter had taught me about life and death and given me a range of practical skills. Going organic and joining the Tir Gofal agri-environment scheme had developed my interest in the environmental aspects of farming, and opened up the opportunity to welcome schoolchildren, scout groups and college students from all over the UK and from overseas, who came to learn about environmental issues and food production.

There is no greater satisfaction than seeing bored looks turn to delight on the faces of schoolchildren, and realising that a visit to a farm could be a life-changing event for students previously cut off from the realities and wonders of animal and plant life. When the Foot and Mouth Disease outbreak temporarily put paid to farm visits, I decided to take the farm to local schools by making a short film about the farm to show to pupils.

Since then I have sold my interest in the farm and have become a 'Learning on the Farm' educational officer, co-ordinating visits by schools, local groups and universities to farms in Ceredigion, Carmarthenshire and Pembrokeshire. The work is supported by funding from the Soil Association, the Countryside Council for Wales, the Welsh Assembly Government and the educational body, Enfys. I am working in co-operation with Farming and Countryside Education (FACE), CAFÉ, NFU, FUW, WFU and the County Councils' Education and Biodiversity Departments.

My main aim is to make people aware that farms are a fantastic resource that can provide a 'real education' to every school and college. Today's generation of young people have little idea of what they are eating, where their food comes from, who is managing their countryside or how the environment supports their daily existence. My work helps to address these issues. I also encourage schools, colleges and other groups to study

the biodiversity of Wales locally and to link the farm to all national curriculum subjects.

Firstly I phone each school to find out if my visit fits with the term's curriculum, plus which years are to be involved. We discuss such varied subjects as farming, environmental studies, the food chain, living things, geology and water, and citizenship. We then arrange dates for me to come in to school. Sometimes the farmer will accompany me and we give an interactive talk, getting pupils to contribute. This first lesson is a 'sensory' experience for the children - lots of plants, seeds and produce from the farm to touch, smell and look at. I am a great believer in what Confucius had to say about education:

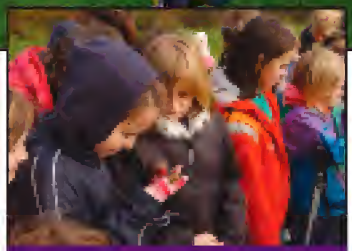
What I hear, I forget.
What I see, I remember.
What I do, I understand.

After break, I show my film 'A Year in a Day', which is about life in a year on a farm. The children have to watch the film as there is a quiz after and prizes for the winners. Education through bribery! I then arrange the farm visit. I try and keep the experience as local as possible so that the kids are learning from their immediate environment. In the words of Albert Einstein: "I never teach my pupils; I only attempt to provide the conditions in which they can learn."

The kids love it. To see them run across a 12-acre field is to see them react like cows out for the first time in spring. It's a great sense of freedom but it's also educational. I strongly feel that unless we give these children the opportunity to enjoy the countryside when they're young, they won't get there later in life. Teachers have commented to me that the days on the farm are worth many hours of classroom time.

In the last two years I have co-ordinated over 140 visits to schools and farms, connecting about 3,500 people with a farm, the environment and where their food comes from. I believe these sensory experiences leave a lasting impression on the young, some of whom will go on to find jobs either in agriculture or in the environment. Among the hundreds of letters received from kids, one wrote recently after a visit: "I really enjoyed your film and everything you talked about, especially your work and the way you plant vegetables on your farm. I think you should be earning more money for your hard work." If only the Government valued farmers as much!

***Nick Rebbeck** is a 'Learning on the Farm' education officer in south west Wales. Tel: 01570 470470. www.learningonthefarm.org.uk.*
Thanks to Tim Jones and Ysgol Tregaron.



Tim Jones

Y clwy yn creu cyfle

Ar ôl 30 mlynedd o ffermio, roedd dyfodiad y clwy'r traed a'r genau yn drobwynt i Nick Rebbeck. Pan ataliwyd pobl rhag ymweld â'i fferm, penderfynodd fynd â'r fferm at y bobl - drwy gyfrwng ffilm yn gyntaf - er mwyn rhannu ei ddiddordeb mewn agweddau amgylcheddol ar amaethu. Bellach mae'n gweithio fel swyddog addysg fferm yn ne orllewin Cymru.

Ei nod yw sicrhau fod ffermydd yn rhoi profiadau addysgiadol gwerthfawr i ysgolion a cholegau cyfagos. Drwy drefnu ymweliadau â 140 o ffermydd dros y 2 flynedd ddiwethaf mae 3500 o bobl ifanc wedi dysgu mwy am eu ffynonellau bwyd, am reolaeth cefn gwlad ac am y rhan y mae'r amgylchedd yn ei chwarae yn eu bywydau dyddiol. Mae'n waith sy'n gofyn am baratoi gofalus, ond mae'r adborth yn ardderchog a'r bobl ifanc yn elwa o fod wedi dod i gysylltiad mwy agos a dwfn gyda' u hamgylchedd lleol.

Maesycrugiau Bridge . In 2005 the Afon Teifi had the second largest sea trout run in England and Wales.

Tristan Hatton-Ellis

The enigmatic and elusive **sewin**

our Welsh sea trout

Most of us have heard of the sewin or sea trout, but do we really know what it is? For a start, is it a trout or a salmon? The answer, and other surprising facts about the lifestyle of this most desirable and beautiful of fish, is provided by ***TRISTAN HATTON-ELLIS, ZIGGY OTTO*** *and* ***MAGGIE HATTON-ELLIS****.*

Stand patiently by a waterfall in spate in autumn, and you stand a good chance of seeing a salmon leaping. Staring into the swirling white waters, a dark silhouette appears, and for a brief moment propels itself into the air, out of the crushing force of the torrent. The salmon re-enters the water near the top of the cascade and is gone.

Except it probably wasn't a salmon, but a sea trout. These beautiful, silvered fish ascend the rivers at the same time as salmon, with much of the same athleticism. Last year, almost five times as many sea trout as salmon were caught in Wales. This article explores the native Welsh sea trout, known locally as sewin.

The native trout *Salmo trutta* must be one of the most familiar of all British native freshwater fishes. It is probably the most widespread of all British fish, occurring in freshwater and coastal habitats almost everywhere in the British Isles[1,3]. In Wales, trout have been recorded

from almost every 10km square, and the chances are that if you are on or in a body of water, there is a trout somewhere near you.

Trout come in many 'flavours'. Any angler will tell you that each water has its own characteristic size and shape. There are small stunted fish with large eyes and toad-like heads that eke out a living in acid upland lakes, and sleek, streamlined fish in the large rivers such as the Wye and Usk. There are the mysterious predatory ferox trout that frequent deep lakes such as Llyn Tegid, the descendants of an ancient race of trout that colonised soon after the end of the last Ice Age. This adaptability means that trout can live in a great range of habitats, from cold, clear mountain lakes like Llyn Cau on Cadair Idris, to productive lowland waters such as the Anglesey lakes. These variants have arisen through a combination of genetics and the environment, shaped over many generations.

By far the most distinctive of the trout variants, however, is the sea trout. Unlike other trout, these do not remain in freshwater, but migrate to sea. Sea trout do not resemble other trout; with their silver colouration and large size, they look more like salmon. This distinctive form of trout was until recently recognised by scientists as a different subspecies to resident brown trout. It was widely assumed that these two forms rarely, if ever interbred. How else could a single river sustain two such different types of trout?

Recent findings have shown that the old assumptions about two genetically distinct races of trout cannot be true. Although many resident brown trout populations have equal sex ratios, a very high proportion of sea trout are females. In some river systems, almost all sea trout are female. Genetic studies and tagging studies have shown that sea trout interbreed freely with brown trout. Intriguingly, the offspring of brown trout parents may also become sea trout. Only recently, by piecing together evidence from many sources, have scientists been able to unravel the biology of the sewin.

Like salmon, trout spawn in clean gravel beds in upland rivers. The fry hatch out in spring, and live for 2-4 years in rivers as parr. Parr have distinctive vertical black banding (parr markings) that camouflage the

Brown trout

Alastair Robertson

Maggie Hatton-Ellis

Sea trout smolt

young trout by helping to break up their outline.

As they grow, parr move downstream. Upland rivers are poor in nutrients, and fish that stay in these waters grow slowly. Indeed, many such rivers are too small and shallow in summer to support large trout so, as they grow, the fish are forced to move to larger streams. But upland rivers also have few predators - kingfishers, otters and herons rarely venture far into the uplands. In lowland rivers the pickings are richer, but so are the risks. Estuaries and the open sea are better still, with rich pickings of shrimps and prawns, but even more predators are at large - seals, dolphins and cormorants, for example, not to mention anglers and netsmen. Moreover, entering salt water requires huge physiological changes that put great strain on the young trout.

As a result, each fish faces a life choice of whether to stay put, or to move on. This choice is not the same for the two sexes. For males, it turns out that the best policy is often to stay at home. Sperm are relatively cheap to manufacture, so at mating time even a small male can potentially fertilise many thousands of eggs. Of course, a large male is more attractive to females and is better equipped to defend a territory, but these advantages are not overwhelming in comparison to the risks. In contrast, for female trout reproductive success is directly proportional to body mass - big trout produce more eggs. And the only way a river trout can grow really big is to go to sea - or at least move downstream.

Even once they have gone to sea, trout show an astonishing diversity of strategies. Some fish - so-called 'slob trout' - stay in estuaries and inlets close to their natal river. This type of fish is particularly common in Scotland, where the coastline lends itself to this life history. Others will spend only one summer at sea and return to the river for the winter, often to spawn. These relatively small sea trout are termed whitling or finnock. The larger sea trout will have spent several years at sea and may have spawned on several occasions - unlike salmon, sea trout do not necessarily die after spawning. However, even large sea trout will have remained predominantly in inshore waters, in contrast to salmon, which will feed mainly in oceanic waters off Greenland.

The Environment Agency publishes annual fisheries

statistics for sea trout. An interesting picture emerges when these numbers are compared. For example, the Teifi and Tywi both have large sewin runs. Last year 4,700 were caught on the Tywi and 4,300 on the Teifi - using the 'ten per cent rule', that anglers typically catch around 10% of migratory fish returning to a river, this suggests that 40-50,000 fish ascend each river every year. Yet the figures for two other great rivers in Wales, the Wye and Usk, are very different. Just 84 sewin were caught on the Wye last year, and 244 on the Usk. If this is a question of habitat choice, this makes sense. Much of the Wye and Usk are still good brown trout habitat, and there is no need to go to sea. Moreover, the Severn Estuary, with its strong tides and turbid conditions, is not good sea trout habitat. In contrast, the productive yet clean waters of Cardigan Bay and around Pembrokeshire are better habitat, while steep, nutrient poor and often acidified rivers in west Wales offer poor growing conditions. Thus in west Wales the trout population are predominantly going to sea, whereas in the south-east, they remain in the rivers.

Tristan Hatton-Ellis

Brown trout lack the conspicuous silvering of sea trout.

In Wales, sewin (and salmon) are subject to three distinctly different types of fisheries: rod and line angling, seine netting and the unique coracle fishery.

For many years sea trout were a poor relation to salmon; indeed one of us knows of a manager operating a fish trap who used to kill sea trout because they were 'vermin'. However, as salmon numbers have declined, many anglers have turned to sea trout. Fly fishing for sea trout is usually nocturnal, and requires stealth and patience. Speak to many anglers and they will tell you that there is more 'sport' in angling for sea trout than salmon. Welsh rivers account for more than half the sea trout caught in England and Wales, and a number of large individuals are caught in most years. Thousands of rod and line anglers are attracted to the main Welsh game rivers every year, injecting millions of pounds into the local economy, as Wales is considered among the top five venues in the world. More than 75% of all angling enquiries are specifically about the availability of sewin fishing. A 28lb specimen was caught in Wales in 1992!

The seine net is the most common form of net fishing in estuaries for sea trout (and salmon) in Wales and has changed very little since Thomas Pennant, a naturalist and antiquary of a Welsh gentry family from Flintshire, described the method in detail for the first time in 1769[5]. A net is released from the stern of a boat, one end held by a netsman on the shore, and the loop is drawn together when the boat returns to shore and both ends of the net, with contents, are pulled onto the beach.

Coracle fishing for sea trout (and salmon) is unique to Wales, being confined to the rivers Teifi, Tywi and Taf. Traditional coracles are made from a wooden frame covered with hide, although modern coracles are manufactured using fibreglass or aluminium. In the Mabinogion, dating from before the 13th century, there are references to a “leather bag” boat. In the 1400s, the Gododdin poem reads "He would kill a fish in his coracle" - no doubt a sewin or salmon. Later poems in the following century recall a coracle covered in a black skin from a black bullock (Welsh Black?) and waterproofed with tallow cake.

The net used by the coracle fishery, suspended between two coracles, consists of two sheets of

netting of different mesh sizes. A fish striking the smaller mesh may be held by its gills but drives a pocket of this netting through the larger mesh (the armouring) and is trapped. The net is payed out across the river channel and is held by two netsmen, one in each coracle. The netsmen, with the aid of a single paddle, make their way with the current. When a fish is felt to strike the net, it is allowed to trap itself before the net is recovered and the fish untangled and dispatched. Most coracle fishing takes place at night. The coracle fishery is regulated by licence from the Environment Agency Wales, rather than the South Wales Sea Fisheries Committee.

Like salmon, sewin depend upon clean headwaters and good access to their spawning grounds. Adequate freshwater flows in rivers and their tributaries, discharging into their respective estuaries, are required for migratory salmonids. Flows must be sufficiently attractive in quantity as well as quality so that the migratory fish can identify their home rivers, and to induce their migration upstream. Trout are stimulated to migrate upstream by 'freshets' - pulses of fresh water flowing down the river that indicate that water levels will be sufficiently high for migration. The extremely dry spring of 2004 saw only approximately one third of the number of salmonids ascend the rivers Tywi and Teifi compared to the same period in spring 2003[6]. In some rivers, water is released from reservoirs to encourage fish migration during low flow periods.

There is some evidence that trout populations may shift their behaviour in response to changing environmental conditions. For example, the Afon Teifi last year had the second largest sea trout run in England and Wales (no official sea trout figures are available for Scotland). Yet this was not always so - the Teifi was formerly famous for its brown trout fishing[4]. Is it possible that trout in the Teifi have adapted to a decline in river habitat quality by migrating to sea?

It is believed that climate change also plays a role in the timing of salmonid runs. Spring and autumn runs occur later, with the autumn run increasingly more important than the spring one. The exact reasons for this are not well understood, but a combination of changes to temperature and rainfall are likely to be the main causes. More and more fish now enter Welsh rivers after the season has closed, thereby luckily escaping the gauntlet of fishermen and anglers during open season.

Sea trout and salmon have broadly similar habitat requirements and life cycles and they are often found together. Traditionally, the fisheries for these species have been assessed and managed independently and most of this effort has gone into salmon fisheries. Consequently the conservation of sea trout stocks has historically been incidental to the protection and management of salmon (and brown trout) stocks, with little if any regard being given to the particular needs

Tristan Hatton-Ellis

The Afon Tywi near Llandeilo

of the sea trout itself. The various protection and conservation measures currently employed for all life stages of the species, whether statutory or voluntary, are still poorly developed and apparently inadequate for the holistic approach that is required.

More international effort and consensus is necessary to address the possible problems that are affecting stocks in the marine phase of the sea trout's life (e.g. the food supply of sea trout at sea, influence of sea lice infestations from fish farms, illegal netting, by-catch of smolts in the pelagic fishery and predation by seals) as well as the effects of farmed fish escapees (in particular the potential threat of those with any future genetically engineered traits) on wild fish strains.

In 2004, Wales hosted the first international conference on sea trout, an event attended by over 300 scientists, policy makers and fishery managers. The proceedings will be published early in 2007[2], and will be an important new reference on the subject. One positive outcome from the conference was the obvious interest in sea trout from a wide range of countries. The Welsh and Irish Governments are currently investigating the possibility of a project to conserve sea trout in the Celtic Sea. It is to be hoped that this and similar initiatives will ensure that these magnificent fish continue to flourish in Welsh rivers.

__Dr Tristan Hatton-Ellis__ is CCW's Senior Freshwater Ecologist, __Dr Ziggy Otto__ is Lecturer, Coastal Zone & Marine Environment Research Unit, Pembrokeshire College, University of Glamorgan, and __Maggie Hatton-Ellis__ is CCW's Environmental Surveillance Officer. The views expressed in this article are those of the authors and do not necessarily reflect those of CCW.

Further reading

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4. O'Reilly, P. (ed) (1998) *Tribute to the Teifi*. Llandysul Angling Association, Llandysul.
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6. Fish counter data, Peter Clabburn, EAW, pers. comm.

Datrys dirgelion y sewin

Er tebyced yw i'r eog, wrth esgyn a llamu ar hyd ein hafonydd, math o frithyll yw'r sewin mewn gwirionedd. Mae gwedd ac ymddygiad brithyll yn amrywio o le i le oherwydd dylanwadau geneteg ac amgylcheddol - y sewin yw'r unig fath o frithyll sy'n mudo rhwng afon a môr. Mae'n fwy na'r brithyll gwyllt, ac yn lliw arian, ond gall y ddau fath groesi o fewn yr un afon. Nid pob sewin sy'n mudo i'r môr. Y benywod sy'n fwyaf tebygol o ymgymryd â'r siwrnai beryglus gan fod angen iddynt fagu pwysau er mwyn ailgenhedlu'n llwyddiannus. Bydd rhai yn aros ger y lan, eraill ond yn treulio un haf yn y môr a rhai yn aros am sawl blwyddyn cyn dychwelyd. Mae'r patrwm yn amrywio o afon i afon - bydd miloedd yn mudo ar hyd afonydd Teifi a Thywi gan fod bae Ceredigion yn cynnig mwy o fwyd. Ond ychydig sy'n mudo ar afonydd Gwy a'r Wysg gan fod yr afonydd yn gyfoethog ac aber Hafren yn llawn tyrfedd. Gall y patrwm hefyd newid dros gyfnod, oherwydd ffactorau fel newid hinsawdd, neu waethygiad yng nghyflwr afon sy'n gorfodi mwy o bysgod i fudo at ddyfroedd mwy cyfoethog.

Mae pysgota sewin yn cynyddu mewn poblogrwydd wrth i eog brinhau ac mae'n werth miliynau i economi Cymru. Mae'n gofyn am bysgota llechwraidd, liw nos - yn draddodiadol gyda rhwydi sân ar yr aberoedd, neu gyda'r cwryglau unigryw Gymreig ar afonydd Taf, Teifi a Thywi. Rhaid i'r sewin gael cyflyrau tebyg i'r eog - blaenddyfroedd glân, mynediad rhwydd at fannau silio, llif da yn yr afon a hyrddiadau o ddŵr croyw sy'n annog y pysgod i symud nôl o'r môr. Ond mae'n bwysig rhoi ystyriaeth lawn i anghenion y sewin, mewn afonydd ac yn y môr, yn hytrach na dibynnu ar reolaeth pysgodfeydd eog i'w gwarchod.

Cymru a'r byd

Rwy'n cyfri - Roeddwn i yno

Ar y 4ydd o Dachwedd ymgasglodd mwy na 25,000 o bobl yn rali 'Stop Climate Chaos' (SCC) yn Llundain, y diwrnod cyn y trafodaethau holl bwysig rhyngwladol ar newid hinsawdd yn Nairobi ac yn union o flaen Araith y Frenhines yn nodi dechrau Blwyddyn Seneddol newydd. Bu i lawer mwy nag a allai fod yno arwyddo eu cefnogaeth ar-lein ar wefan **'I Count'** (www.icount.org.uk) sy'n annog pobl yn bendant iawn i gredu y gallant wneud gwahaniaeth.

Oherwydd fy mod yn gweithio i WWF Cymru, cefais gyfle i fynd yno fy hun. Bu i ni adael Caerdydd am 7.30am ac roedd ein bws yn llawn o amrywiaeth o bobl. Yn ogystal ag aelodau o SCC yng Nghymru, roedd yno staff Cyrff nad oeddynt yn ymwneud â'r Llywodraeth, yr Aelod Cynulliad Mick Bates, staff y Cynulliad ac aelodau cyffredin o'r cyhoedd. Pan gyrhaeddwyd Llundain fe'n daliwyd yn ôl yn ymyl y Senedd wrth i barêd o gannoedd o feiciau fynd heibio o flaen y bws gyda melinau gwynt llachar yn troelli wrth iddynt seiclo, rhai gyda'r capsiwn "Fossil Fool" ar faneri y tu ôl iddyn nhw. Teithiodd pobl o bob cwr o'r Deyrnas Unedig i fod yno, a llawer yn defnyddio cludiant gwyrdd - yn seiclo, canŵio (roedd un grŵp wedi canŵio i lawr o Rydychen!) neu yn teithio mewn tacsis biodanwydd.

Pan gyrhaeddwyd yr Embankment cawsom ein rhannu i fynd i'n stondinau amrywiol. Roedd yr RSPB wedi trefnu'r cyfarfod mwyaf erioed o'i staff gwirfoddol - 1,000 o bobl - i orymdeithio i Sgwâr Trafalgar, yn dilyn anerchiad ffurfiol ar newid hinsawdd gan y Prif Weithredwr Graham Wynne. Roedd WWF yn dangos ffilm am newid hinsawdd bob 20 munud yn yr Odeon, ac yn cyfarfod ac yn cyfarch aelodau gan gynnig hetiau WWF iddynt eu gwisgo ar yr orymdaith.

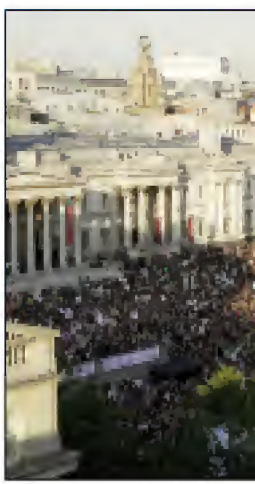
Ganol dydd aeth y rhan fwyaf ohonom i Lysgenhadaeth yr Unol Daleithiau yn Sgwâr Grosvenor i wrando ar areithiau gan yr AS Norman Baker a Colin Challen, Zac Goldmsith, Caroline Lucas ASE, George Monbiot, Miranda Richardson a llawer o bobl eraill. Roeddent yn siarad yn angerddol am y cyfeiriad y dylem fod yn ei gymryd fel cenedl, goblygiadau Arolwg Stern, a beth y gallwn ni fel unigolion ei wneud yn ein bywydau bob dydd. Roedd KT Tunstall a Razorlight yn chwarae setiau rocio yno i'r gynulleidfa oedd wedi ymgynnull i wrando.

Mae SCC yn galw am Fesur Newid Hinsawdd a fydd yn ei gwneud yn ofynnol i Lywodraeth y DU ymrwymo i Gyllideb Carbon fel dull o reoli allyriadau o nwyon tŷ gwydr, ac i sicrhau bod y rhain yn cael eu gostwng o 3% flwyddyn ar ôl blwyddyn. Gweledigaeth SCC yw byd lle mae newid yn yr hinsawdd sy'n cael ei achosi gan ddyn yn cael ei rewi ar lefel a fydd yn caniatáu i ddynoliaeth gyfan a bioamrywiaeth arall ffynnu, trwy gyfrwng cyfiawnder cymdeithasol, amgylcheddol ac economaidd byd-eang.

Erbyn y byddwch yn darllen hwn, bydd rhai wythnosau wedi mynd heibio ers yr orymdaith. Ar Dachwedd 15fed cyhoeddodd Araith y Frenhines gynlluniau i'r Llywodraeth gyflwyno Mesur Newid Hinsawdd "fel rhan o'i pholisi i warchod yr amgylchedd, sy'n cyd-fynd â'r angen i sicrhau cyflenwadau egni dros dymor hir". Mae'n gyfrifoldeb ar bawb ohonom ddal ati i atgoffa'r Llywodraeth fod hyn yn rhywbeth arall yr ydym ni, ei hetholwyr, yn dymuno ei gael. Pan fo pleidleisiau yn y fantol, yna efallai y bydd gwleidyddion yn cymryd sylw gwirioneddol o'r geiriau 'Rwy'n cyfri'.

Nicky Starkey
Swyddog Polisi WWF Cymru

Mae 'Stop Climate Chaos' yn glymblaid o 45 o wahanol gyrff, sy'n ymdrechu i gael pobl i sefyll ar eu traed a dweud "Rwy'n cyfri" wrth wneud penderfyniadau am reoli newid hinsawdd. Maent wedi cynhyrchu llyfr 'I Count' *a adolygir ar dudalen 44. Aelodau SCC yng Nghymru yw CAFOD, Coed Cadw, Canolfan y Dechnoleg Amgen, Cymorth Cristnogol, Cyfeillion y Ddaear Cymru, Greenpeace, Ffederasiwn Cenedlaethol Sefydliadau'r Merched, Oxfam Cymru, Pobl a'r Blaned, RSPB Cymru, Sustrans, Tearfund, Ymddiriedolaethau Bywyd Gwyllt a WWF Cymru.*



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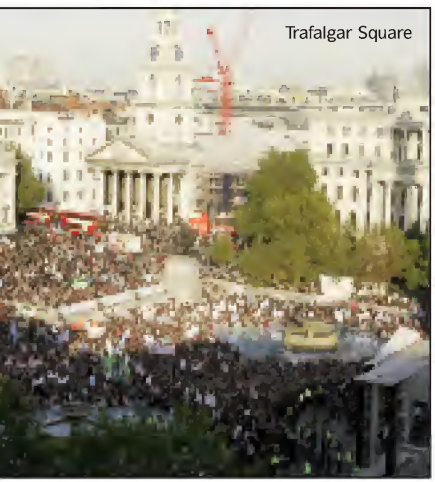
Wales and the world

I count - I was there

On 4th November more than 25,000 people gathered at the Stop Climate Chaos (SCC) rally in London, on the eve of critical international climate change talks in Nairobi and just before the Queen's Speech marking the start of a new Parliamentary Year. Many more who could not be there signed up online on the **I Count** website (see below).

Working for WWF Cymru, I got the chance to go along in person. We left Cardiff at 7.30am, our bus full of a variety of people. As well as members of SCC in Wales, there were NGO staff, Assembly Member Mick Bates, Assembly staff and ordinary members of the public. When we reached London we were held up near Parliament as a parade of hundreds of bikes passed in front of the coach with bright windmills spinning round as they cycled, some with the caption "Fossil Fool" on flags behind them. People travelled from all over the UK to be there, many using green transport - cycling, canoeing (a group had canoed down from Oxford!) or travelling in biofuel taxis.


Trafalgar Square

When we arrived at the Embankment we all split up to go to our various stands. The RSPB had organised the biggest ever meeting of their volunteer staff - an impressive 1000 people - to march to Trafalgar Square, following a formal climate change talk from chief executive Graham Wynne. WWF was showing a climate change feature film every 20 minutes in the Odeon, and meeting and greeting members offering WWF branded hats to wear on the March.

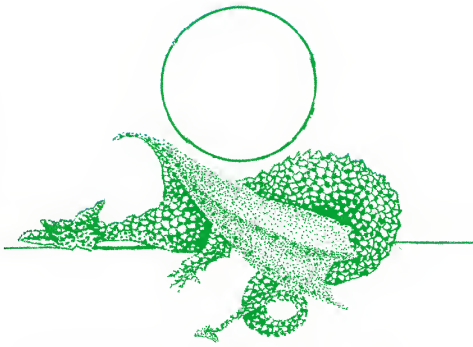
At noon most of us made our way to the US Embassy in Grosvenor Square to listen to speeches from MPs Norman Baker and Colin Challen, Zac Goldsmith, Caroline Lucas MEP, George Monbiot, and many others. They talked passionately about the direction we should be taking as a nation, the implications of the Stern Review, and what actions we as individuals could take in our daily lives. KT Tunstall and Razorlight played rocking sets for the assembled crowd.

SCC is calling for a Climate Change Bill that will require the UK Government to commit to a Carbon Budget as a way of managing greenhouse gas emissions, and to ensure these are cut by 3% year on year. The vision of SCC is that of a world in which human-induced climate change is capped at a level that will allow all of humanity and other biodiversity to prosper, by means of global social, environmental and economic justice.

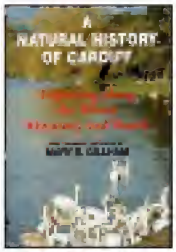
By the time you read this, several weeks will have passed since the march. On 15th November the Queen's Speech announced plans for the Government to introduce a Climate Change Bill "as part of its policy to protect the environment, consistent with the need to secure long-term energy supplies." It's up to all of us to keep on reminding the Government that this is something we, its electorate, want. When votes are at stake then perhaps politicians will truly take notice of the words "I Count".

Nicky Starkey
Policy Officer, WWF Cymru

Stop Climate Chaos is a coalition of 45 organisations, which wholeheartedly encourages people to believe they can make a difference. They have produced a book I Count *(see p44). The members of SCC in Wales are CAFOD, Coed Cadw, Centre for Alternative Technology, Christian Aid, Friends of the Earth Cymru, Greenpeace, National Federation of Women's Institutes, Oxfam Cymru, People & Planet, RSPB Cymru, Sustrans, Tearfund, Wildlife Trusts and WWF Cymru. (www.icount.org.uk).*



Green **Bookshelf**



A NATURAL HISTORY OF CARDIFF - EXPLORING ALONG THE RIVERS RHYMNEY AND ROATH

Mary E. Gillham
Dinefwr Publishers 2006
£14.50 488 pages

This book is the third and final volume of Dr Mary E. Gillham's magisterial *Natural History of Cardiff*. The previous volumes were *Garth Countryside: part of Cardiff's green mantle* and *Exploring along the River Taff*.

Dr Gillham is a naturalist of distinction whose career as a writer and scientist spans the last four decades and more. Her accounts of her work in New Zealand and Macquarie Island in the 1960s remain invaluable introductions to these places today. Her more recent works on the Gower and on the Glamorgan Heritage Coast are still useful source documents, and her work in Wales and overseas has been an inspiration to generations of scientists and field naturalists. She is an undoubted asset to Wales and to the Welsh conservation movement.

As a newcomer to Cardiff I was delighted to be asked to review this new work from the standpoint of a recent arrival to the Welsh capital. I was being given the opportunity to read the latest work by an author whose New Zealand writings I had enjoyed many years ago and I eagerly anticipated a detailed overview of the wildlife of my new hometown.

That this book didn't live up to my expectations should not be attributed to any lack of knowledge of her subject on the author's part. On the contrary - it would be difficult to name anyone better qualified to write on the wildlife of Cardiff and how it changed in the last third of the twentieth century.

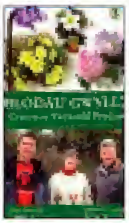
What this book sorely needed however was an experienced editor: someone able and qualified to cut incisively into the mass of material contained in this volume, to bring some order and coherence to it, and to draw out its underlying themes. There are at least two worthwhile books half-written here; a guide to (East) Cardiff and its wildlife, and a collection of the author's personal reminiscences of the area over the last forty years or so. This book sadly falls uneasily between these two stools. As it stands it is perhaps better described as an old-style miscellany rather than anything else.

The book also lacks an index, an essential constituent part of any work purporting to be an authoritative natural history, and a site-by-site account of this type should surely have grid references throughout. Better proofreading would have eliminated mistakes in spelling and punctuation, removed at least some grammatical errors and the episodic appearance - for no apparent reason - of PHRASES IN BLOCK capitals.

The author's heart is definitely in the right place however, and she provides fascinating accounts of the impact of development on sites and species in Cardiff in recent decades. A natural history of Cardiff - perhaps along the lines of Jonathan Mullard's recent work on the Gower - still remains to be written. I can only hope that the book reviewed here doesn't inhibit its publication.

David Mitchell

BLODAU GWYLLT - CYMRU AC YNYSOEDD PRYDAIN



John Akeroyd/Bethan Wyn Jones
Gwasg Carreg Gwalch 2006
£12.50

Rhaid i mi gyfaddef mod i'n un sy'n hoff o fodio'n ysgafn drwy lyfr er mwyn adnabod planhigyn newydd, os dof o hyd i rywogaeth anghyfarwydd wrth fynd am dro. Dibynnu ar olwg blodyn, yn hytrach nag ar allwedd, y byddaf i'n dueddol o wneud. I minnau felly, ac i rai tebyg i mi, mae'r llyfr hwn yn ddelfrydol. Ceir un dudalen i bob rhywogaeth, trefnir y blodau yn ôl teuluoedd a cheir lluniau cynrychioliadol iawn o gymeriad bob planhigyn. Bydd ffurf y llyfr yn gyfarwydd i bobl sydd wedi hen arfer â chyhoeddiadau poced eraill HarperCollins, fel y 'Wildguides' poblogaidd.

Yn sicr, un o gryfderau'r llyfr hwn yw ei fod mor gryno a chlir. Ar bob tudalen mae'r 'ffeil ffeithiau' yn disgrifio ffurf pob blodyn a'r nodweddion sy'n ei wneud yn wahanol i blanhigion tebyg. Mae'r prif destun yn disgrifio'r cynefinoedd lle mae'r blodyn yn dueddol o gael ei ddarganfod.

Silff Lyfrau Amgylcheddol

Mae'r llyfr yn cadw at y ffurf syml hon wrth gyfeirio at 240 o'r blodau mwyaf cyffredin Cymru ac Ynysoedd Prydain. Ymhlith y rhain mae rhai planhigion sydd wedi cael eu cyflwyno o wledydd tramor ond sy'n eithaf cyffredin yn ein cefn gwlad erbyn hyn. Nid yw'r llyfr yn cynnwys gwybodaeth gynhwysfawr am lysieueg yr ucheldir, sydd mor gyfoethog yng Nghymru, ond efallai y byddai hyn yn gofyn gormod o lyfr poced.

Yr hyn y mae'r llyfr yn ei gynnig yn newydd yw'r cyfrwng Cymraeg. Addasiad yw'r llyfr hwn ac mae'r ieithwedd yn eithaf anffurfiol - sydd yn hollol addas i'r math yma o lyfryn maes. Yr hyn a geir yma hefyd, wrth gwrs, yw casgliad o enwau blodau diddorol a darluniadol. Os oes sawl enw i gael ar blanhigyn, mae'r amrywiaeth yma o enwau yn cael ei restru ar ddiwedd y testun. Weithiau ceir cyfeiriadau at gysylltiadau diwylliannol gwahanol blanhigion, fel yn achos cerdd 'Clychau'r Gog' R. Williams Parry, er enghraifft.

Gallaf ddychmygu y bydd 'Blodau Gwyllt' yn helpu cadw enwau planhigion Cymraeg yn gyfoes ac yn ysbrydoli Cymry Cymraeg i'w defnyddio. Hefyd mi fydd y llyfr yn fodd i gyflwyno'r enwau Cymraeg i ddysgwyr sydd â diddordeb mewn blodau gwyllt.

Rwy'n gallu rhagweld y bydd y llyfr hwn yn dod yn hen ffrind i mi; mae'r maint mor hwylus ac ymarferol dwi'n sicr y bydd yna le iddo bob amser yn fy mhecyn cefn pan fyddaf yn mynd allan i grwydro.

Charlotte Williams

THE LIVERWORTS, MOSSES AND FERNS OF EUROPE

W. Frey, J.-P. Frahm, E. Fischer & W. Lobin, (ed. T.L. Blockeel)
Harley Books
2006
Hardback £45

The aim of this fieldguide-sized book is an adventurous one: to allow the user to identify any moss, liverwort, hornwort, fern or fern ally they should encounter in Europe. Its scope is vast, covering almost 2,000 species from places as different as northern Finland and southern Spain. Given the number of species and the portable size of the book, there is no space for lengthy text, so everything is condensed into a series of extended keys, with succinct descriptions of each species' diagnostic characters. This worked well in the original German *Kleine Kryptogamenflora* and subsequent *Die Moos- und Farnpflanzen Europas* - so much so that most British bryologists bought them. Now we have our own English language version, translated by the authors and then edited and arranged for a British audience by Tom Blockeel, one of Europe's leading bryologists.

The text is superbly accurate, reads very well and is a credit to the authors and the editor. The book is illustrated with 1,938 line drawings and 28 SEM (scanning electron microscope) photographs, covering most species. The bryophyte SEMs were taken specifically for the book and some of the fern drawings are new, but most illustrations have been reproduced from over 30 different Floras, including Mönkemeyer (1927), Crum & Anderson (1981) and Smith (1978). As a result they are rather variable, albeit mostly good and clear. Some of the pleurocarps, taken from Mönkemeyer, look dense and dark, but at least there are drawings of whole plants, a notable omission from Smith.

The bryophyte sections are extremely comprehensive and the keys work well. They are not designed for field use and include the cell measurements and peristome characters that are inevitable in bryology. The majority of European species are keyed out, but a few more minor ones, or those of uncertain status, are included as notes in relevant places within the key: only *Schistidium* splits seem to have been avoided entirely. Taxonomic notes and identification hints are indicated with a •, which makes them stand out from the main key very well. This is a welcome innovation of the English version.

It may seem odd to include ferns within a bryophyte book, but they are cryptogams and they have been covered together since the *Kleine Kryptogamenflora*. The fern section is as thorough as the bryophyte one and covers many of the hybrids, infraspecific taxa, and difficult genera, such as *Cheilanthes* and *Isoetes*, which challenge the modern pteridologist. Like the bryophyte section, it is a remarkably up-to-date treatment, although it sensibly ducks out of the problem of how to divide the *Dryopteris affinis* complex.

Green **Bookshelf**

This is not really a book for beginners. The bryophyte keys are very good, but are not 'easy going' and so many species are included that they can be daunting. However, they will provide the Welsh bryologist with helpful alternatives to Smith and are essential for keen bryologists who travel in Europe. The fern section provides the travelling fern enthusiast with the chance to identify almost any European species and is likely to be much more popular with the *Natur Cymru* readership. All in all, this is a superb and detailed book.

S.D.S. Bosanquet

RHAGOR O ENWAU ADAR

Dewi E. Lewis yn y gyfres 'Llyfrau Llafar Gwlad', Rhif 66
Gwasg Carreg Gwalch 2006
Clawr meddal £4.95

Llyfryn bach o 79 tudalen yw 'Rhagor o Enwau Adar' gan yr awdur Dewi E. Lewis ac mae ynddi ddwy brif restr sef yn gyntaf, Enwau Adar - Cymraeg/Lladin/Saesneg ac yn ail, Enwau Adar - Saesneg / Lladin / Cymraeg, ac fel cyfieithydd fy hun, credaf fod nodi'r enw Lladin yn y rhestr yn angenrheidiol a phob clod i Dewi Lewis ar wneud hyn. Dilyn ei gyfrol gyntaf o'r enw 'Enwau Adar' a gyhoeddwyd ym 1994 y mae'r llyfryn hwn.

Er mwyn rhoi'r llyfr ar waith, dewisais enw Cymraeg ar aderyn ac wedyn enw Saesneg a chwiliais drwy'r llyfr am yr enwau cyfatebol. Yr enghraifft Cymraeg a ddefnyddiais oedd 'aderyn y bwn' ac roedd yr enw Saesneg cyfatebol yno sef 'bittern'. Yr enghraifft Saesneg a ddefnyddiais oedd 'bullfinch' ac roedd yna lawer fersiwn o'r enw Cymraeg yn cael ei restru sef Aderyn Pensidan, Chwibanydd, Aderyn y Berllan, Bwlffin (Bangor) Rhawngoch, Twm Cwinc (Morgannwg), Aderyn Rhongoch, Aderyn Rhawngoch, Gwas y Siri, Aderyn Coch, Aderyn Rhown Goch (Llanddysul), Coch y Gors (Nantgarw), gydag amrywiadau tafodieithiol yn dibynnu ar ba ardal yr ydych yn byw.

Fel y dywedir yn y broliant ar glawr cefn y gyfrol: "Ceir yma gasgliad gwerthfawr o enwau sy'n haeddu'i le wrth benelin pob adarwr - y rhai sydd yn cael blas ar fyd natur ac ar enwau". Mae yna lun trawiadol o las y dorlan ar y clawr blaen a dynnwyd gan y diweddar E Breeze Jones ac mae hwn yn lun a fyddai'n sicr o dynnu sylw'r darllenydd at y llyfryn hwn ac mae'r clawr fel cyfanwaith wedi'i gynllunio yn gelfydd gan Sian Parri.

Yn y Rhagair dywedir fod apêl am 'Ragor o enwau' a phethau felly yw rhestrau - maent bob amser yn tyfu ac yn ehangu. Yn fy marn i, mae 'Rhagor o Enwau Adar' yn lyfryn bach addas iawn i bwrpas y cyfieithydd ac i'r adarwr dwyieithog fel ei gilydd, ac yn werth i chwi gael copi ohono ar eich silff lyfrau. Edrychwn ymlaen at y gyfrol nesaf gyda rhagor o enwau!

Gwenllïan J Rowlinson

I COUNT: YOUR STEP-BY-STEP GUIDE TO CLIMATE BLISS

©Stop Climate Chaos
Penguin 2006, £3.00

I Count demonstrates that what you do really does count. Information provided by scientists, the government and the press on climate change can be at best depressing and at worst inaccessible: this little book is clear and best of all it empowers people. *I Count* is short, snappy, informative and full of ideas for things that individuals can do to reduce carbon emissions. In addition it contains interesting facts, figures and useful contacts to support changes as well as useful ammunition for answering difficult questions. People will find it irresistible - I know, as I left this book on my kitchen table over the weekend and everybody who sat down picked it up and read it. Discussion was stimulated and each person from my teenage son to a visiting friend went away promising to try out ideas set out in the book. We already live by some environmental principles in our house, yet this book will help us to do more. A book for every public space, this book should be widely circulated and on everybody's Christmas list. *I Count* is just £3 and you can save much more than this just by turning off electrical appliances not in use - *I Count* tells you how much. Brilliant - it takes just 15 minutes to read but the consequences could be felt for generations.

Julia Korn

Silff Lyfrau Amgylcheddol

TEITHIAU CERDDED YR YMDDIRIEDOLAETH GENEDLAETHOL

Dafydd Meirion, Gwasg Carreg Gwalch 2006, £6.50

Mae eiddo yr Ymddiriedolaeth Genedlaethol yn amrywio o blastai mawreddog i draethau ysblennydd, ac mae'r llyfr bach yma yn mynd â chi ar ugain o deithiau o amgylch gogledd Cymru. Mae'r amrywiaeth o wahanol leoliadau yn drawiadol; tai crand tebyg i Erddig, Plas Newydd a Chastell Penrhyn; traethau hyfryd megis Porth Swtan, Porth Dafarch a Phorth Dinllaen; ardaloedd mynyddig megis Cwm Idwal a Hafod y Llan; yn ogystal â theithiau llawr gwlad o amgylch Llanrwst a Chonwy. Mae'r teithiau yn amrywio o 3.5 milltir (awr a hanner) i 10 milltir (pedair awr a hanner).

Mae'r fformat yn syml gyda phob taith wedi'i rhannu; yn gyntaf ceir pwt o hanes i gyflwyno'r lleoliad, yna gwybodaeth ddefnyddiol ar sut i gyrraedd y lle (yn cynnwys cludiant cyhoeddus neu barcio ac ati). Wedyn ceir disgrifiad manwl o'r daith ac, yn olaf, disgrifir pethau sydd o ddiddordeb yn yr ardal. Mae'r darnau dan y pennawd 'Pethau eraill o ddiddordeb' yn dda iawn er mwyn rhoi blas mwy eang ar yr ardal, gyda phytiau bach difyr a mwy o luniau.

Mae hyn i gyd wedi'i drefnu yn daclus mewn llyfr maint poced defnyddiol gyda lluniau bach da. Yr unig beth sydd heb ei wneud yn dda yw'r mapiau. Mae'r mapiau ar gyfer pob taith yn siomedig iawn, yn rhy sgematig i'r cerddwyr, er bod yna ddisgrifiad manwl yn y testun, a does dim llawer o sylwedd, o ran gwybodaeth ar y mapiau, i gael syniad o'r hyn sydd o amgylch yr ardal.

Mae yna nifer o lyfrau cerdded i'w cael yn y siopau yn barod, ond beth sydd yn gwneud hwn yn wahanol ac yn werth ei brynu? Mae'r maint poced, y lluniau bach clir i roi blas ar yr ardal, yn ogystal â'r wybodaeth am yr ardal ehangach, yn gwneud y llyfr yn werth yr arian. Ond byddwn yn awgrymu bod angen gwella'r mapiau, neu gael gwared â nhw a chynnwys mwy o luniau yn eu lle, oes bydd llyfrau tebyg yn cael eu hysgrifennu ar gyfer gweddill Cymru.

Raymond Roberts

Future Books

Birders in Britain and Ireland are now gearing up for a massive exercise to map the distribution of our birds in the 21st century. The British Trust for Ornithology is organising its third breeding atlas (and second winter atlas), with volunteers starting four years fieldwork in autumn 2007. The previous breeding atlas covered 1988-91, the first winter atlas 1981-84. The resulting maps will show how bird distribution has changed over the intervening years. Some (like little egret) have made a first appearance in Wales as breeders, while once common favourites like the yellowhammer will show a much reduced distribution.

What is all this for? No doubt a handsome book (or even two: breeding and winter) will eventually appear, to test our groaning shelves even further. But the maps have a serious conservation function: many of our declining species are not common enough to be counted adequately by annual monitoring schemes such as the Breeding Bird Survey. There are 23 principal biodiversity species of birds in Wales, and for eight of these the trend (up or down) is derived from distribution changes. As an example, the range of the grey partridge contracted by 66% between 1968 and 1991. The third atlas will no doubt show a further decline. The most extreme slide is of course the corncrake, which was still hanging on in the late '60s but no longer breeds in Wales.

In the past, many parts of Britain, including Gwent (1987) and West Glamorgan (1992), have produced more detailed tetrad atlases on a 2x2km grid. It makes sense to do a local atlas at the same time as a national one, and this time round the local organisers in north Wales are planning to do exactly that. This will involve volunteers visiting most, or all (!) of about 2000 tetrads in the breeding season over the four years to 2011. Pembrokeshire has jumped the gun and has just finished the fourth year of a 2003-06 Atlas, which will allow comparison with an earlier study in the mid 80s. Watch this space for a review in 2011!

Geoff Gibbs

Islands round up

News from Ynys Enlli (Bardsey Island)

Gems from the Bardsey Report
The Bird Observatory's excellent Report for 2005 is available (details on www.bbfo.org.uk or phone 01626 773908). It now includes excellent colour photographs (birds, flowers, cetaceans, insects) by the warden Steve Stansfield, and illustrations by his partner Emma. In addition to the usual features (systematic list, breeding bird monitoring, ringing report) there is a short article on the Blyth's pipit which was found on 16th October. All pipits look much the same to most birders, and Blyth's pipit is even worse as it is almost identical to Richard's pipit! The latter is an annual, if uncommon, autumn migrant on Bardsey. Eventually several observers had good views of the Blyth's; if accepted by the Rarities Committee, it will be the first for Wales.

How far out do Manx shearwaters raft?
Another article in the Report describes a recent study on the Manx shearwater colony. These birds only visit their nest burrows on really dark nights, to avoid predation by large gulls. Once they have reached the sea around Bardsey, they form rafts and wait for the right conditions before coming ashore. Visitors staying on the island can get excellent views of groups of restless birds, clearly visible from Pen Cristin in early evening. But it was likely that birds were also rafting at greater distances from the island. In August 2005 the Joint Nature Conservation Committee's Seabirds Unit fitted radio-tags to the tails of 30 adults found in burrows. Signals from the tagged birds were picked up when they returned on subsequent visits. Triangulation of the signals showed that the rafts were indeed up to 9km offshore. This information has enabled the boundary of the Special Protection Area (EU Birds Directive) to be extended, to encompass the rafting sites.

Geoff Gibbs
Texel Ram on Bardsey

Bryophytes (mosses and liverworts)
We have had good information on the lichens of Bardsey, less on the island's bryophytes. This has now been rectified, thanks to a week spent on Enlli by Martha Newton in June 2005. Her report, commissioned by CCW, describes the mosses and liverworts as remarkably numerous and diverse. Her total of 160 species includes 34 new for grid-square SH12, most of which is on the mainland. In all, 25 notable species were found, including the nationally rare (and very small!) *Fissidens curvatus*. This had previously been recorded on an earthy bank near Ty Pellaf. Martha found it on the earthed-up side of a clawdd wall close to Porth Solfach; photographs in her report show the exact location.

Bardsey's sheep going Dutch
New arrivals on the island are eight Texel rams, which are replacing the Welsh Mountain rams used up to 2005. David Barnden, the island's tenant farmer, will use these to produce crossbred lambs, with high carcase quality. As all the lambs will be shipped off the island, replacement Welsh Mountain ewes will be needed in due course. Ironically, Texels resemble a large strain of Llŷn sheep!

News from the Skerries

The Skerries are a small cluster of low rocky islands lying two miles off Carmel Head, Anglesey. With the permission of the owners, Trinity House, the RSPB provide summer wardens to protect and monitor the large tern colony. Ian Sims (RSPB) reports that 2,126 pairs of arctic terns nested in 2006, producing 1.53 young per pair, plus 123 pairs of common terns which produced almost 200 young. The steady increase of this colony is really good news, especially in view of the disastrous breeding failures of arctic tern colonies in Northern Britain in recent years.

Geoff Gibbs

Meadows

At the end of the Foot and Mouth Disease crisis, when access restrictions were lifted, country dwellers and visitors had a brief glimpse of what ungrazed pastures could be like, as plants which had ticked over in the sward burst into bloom. It was brief, and it was localised, but it was a glorious reminder of meadows past; places humming with insect life and filled with flowers like scabious, knapweed, yellow rattle and a host of different grasses.

But do such meadows have a future? Here I am talking about hay meadows on good agricultural soils, which were once a crucial part of the farm economy. This is a habitat which owes its existence to farming practices, and its demise reflects the fact that it no longer fits into modern farming regimes. On deep, easily cultivated soils, hay meadows have become intensive grass leys, cut for silage, heavily grazed or sometimes used to grow crops.

Amongst the threats facing neutral grasslands, as they are unpoetically known, is even the odd paradox. In some parts of Wales, such as the wilds of Meirionnydd, where rainfall is high and soils are generally acid, these wildflower-filled grasslands have depended on regular liming over many years. Now conservation strictures debar owners from applying lime to the best remaining meadows, thereby condemning them to gradual impoverishment!

Neutral meadows are wonderful, uplifting places, which capture the hearts of those lucky enough to visit them at the height of the flowering season. There is an appetite among many conservation-minded people to see not only the better management of existing meadows, but more meadows. Could the time now be right for a big push on behalf of these grasslands?

Common spotted orchid

Liam Robertson

I am a few months into an ambitious project, supported by CCW, to try to help improve their fortunes. I know it won't be easy. There are many practical difficulties, and landowners must be given financial and other help to make things happen on the ground. But I am greatly encouraged by the response to the project so far. The enthusiasm and ready cooperation of the many people throughout Wales who want to do their bit for meadows has been terrific. I won't single out individual people and organisations, but you know who you are - thanks for making this project seem welcome and achievable.

My first task has been to set up a register of flower-rich meadows which can act as seed and green hay sources, so that new flower-filled meadows can be established. I have also written several articles, with more in the pipeline, to extol the virtues of this habitat, and encourage landowners and others to get in touch. This they have done, with a number of potential donor and receptor sites coming to light.

The Grasslands Project is being run by Flora Locale, which has been pioneering techniques to harvest local seed for local meadows and spreading the word about them. Training events, publicity and support for existing local activities are planned for the coming year. If you know of meadows which could be sources of seed or possible new meadow sites, or would simply like to know more, please contact me on **01248 422223** or email **jamrobertson@gmail.com**.

James Robertson is neutral grasslands project officer, Flora Locale.

Hysbysfwrdd / Noticeboard

If you would like your wildlife event to feature on these pages please contact Mandy Marsh on 01248 385574 or email m.marsh@ccw.gov.uk (entries may be edited). Please mention Natur Cymru if you attend any of these events.

Welsh Countryside Management Conference 2007

20-22 March at Theatr Brycheiniog, Brecon.

Participate in the 2007 conference **"Values in Nature."**

The 2007 conference will examine the philosophy and motivation that drives us, in particular whether this is relevant in a world of changing climate, changing policy, changing demographics and changing wildlife.

Who is it for?

Senior reserve managers, wardens, rangers, land managers, other countryside management professionals, academics and individuals aspiring to these posts, including post graduate students. If you leave the conference with your own values having been challenged strongly or even shaken or reinforced, the conference will have served a useful purpose.

If you have any interest and wish to be placed on the mailing list to receive further details, please contact: **ATOM pr cyf, Galeri 5, Doc Victoria, Caernarfon, Gwynedd LL55 1SQ: 01286 685212 / 07766 335612**

Snowdonia Society

EVENTS

For full details tel: **01690 720287**, **info@snowdonia-society.org.uk**, **www.snowdonia-society.org.uk**

13 Jan *Winter walk in the foot-steps of Evan Roberts*

Strenuous winter walk in the steps of the renowned botanist. 9.30am at the Bryn Glo car park in Capel Curig (GR 734571).

31 Jan *Making Snowdonia's buildings more sustainable.*

An evening covering topics such as construction methods, and the use of small-scale renewables. Llanelltyd Village Hall, near Dolgellau GR716195, 7.30pm

20 Feb *Travels in Iceland* Illustrated talk by Ann Yale. Royal Sportsman Hotel, Porthmadog, 7.30pm.

CLEAR UP WORKDAYS

20 Dec, 8 Jan, 20 Feb

Help clear up eyesores in the National Park. Workdays last between 2-6 hours.

FOOTPATH RESTORATION WORKDAYS

19 Jan, 10 Feb, 11 Feb

Improve access to the hills and mountains whilst protecting the landscape from erosion. From 10am to 4pm.

CONSERVATION WORKDAYS

31 Jan Put something back into the area through positive practical action! Workdays can last anything from a couple of hours to a full day.

RSPB

WINTER EVENTS

15, 17, 19, 22, 24, 26 Jan, *Starling roost at Aberystwyth Pier* 3 pm. Details **07726 961217** or **cymru@rspb.org.uk**

2 & 3 Jan - *New Year's guided walk.* Come and walk off your Christmas Lunch! RSPB Conwy nature reserve, 10 am. Small entrance charge. **01492 584091**.

7 Jan *Winter Slumberland*, Newport Wetlands Reserve1.30 -3.30 Join us on a wonderful, slumber survival journey as we explore the reserve's wintering wildlife and test out our own survival skills! Meet in Car park. **01633 275567**.

16 & 17 Jan *Optical Equipment Demonstration*, RSPB Conwy nature reserve. All day. Small entrance fee. **01492 584091**

21 Jan 8am *Field trip to Whiteford Burrows, North*. Book in advance with Joy Lyman, *029 2077 0031*. Please note that this event is organised by an RSPB volunteer group.

2 Feb 3.30 - 5pm *World Wetlands Day*. Newport Wetlands Reserve. The walk should finish with the spectacle of thousands of starlings coming into roost at dusk. Meet in car park. **01633 275567**.

Fenn's, Whixall & Bettisfield Mosses NNR

WINTER EVENTS

28 Dec, 14 Jan, 25 Jan, 11 Feb, 22 Feb, 11 Mar, 22 Mar *Help to restore Britain's third largest raised bog* 10.30am - 3.30pm

4 Feb *Wildlife Gardening Workshop* 10am-4pm Natural England Manor House NNR Base, Moss Lane, Whixall.

28 Mar *The Fabulous Fungi of the Mosses slideshow* 7 pm North East Wales Institute Room B53, (no need to book).

Contact Jackie Giles **01743 282000** **jackie.giles@naturalengland.org.uk** or Joan Daniels (wknds **07974 784799**).

The Mammal Society

TRAINING COURSES

The society runs numerous courses throughout England & Wales. For full details or to book, please contact **training@mammal.org.uk** or **020 7350 2200.**

Wales Biodiversity Partnership

EVENTS

11-24 Dec *Heuldro Gaeaf (Winter Solstice)*. Gwydyr Forest, Conwy. Forest Labyrinth purpose-built to create a magical theatre experience. **Booking essential**. Phone Cynefin **07766 168973**, **caerdroia@cynefin.org.uk**, **www.caerdroia.info**.

Check out the WBP website to find out what's happening in your area **www.biodiversitywales.org.uk** **www.bioamrywiaethcymru.org.uk**

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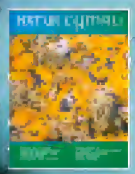

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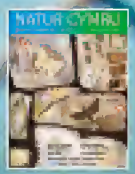

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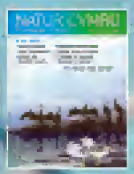

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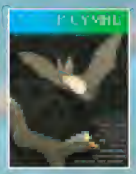

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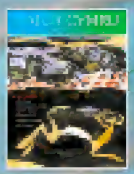

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John Harold

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